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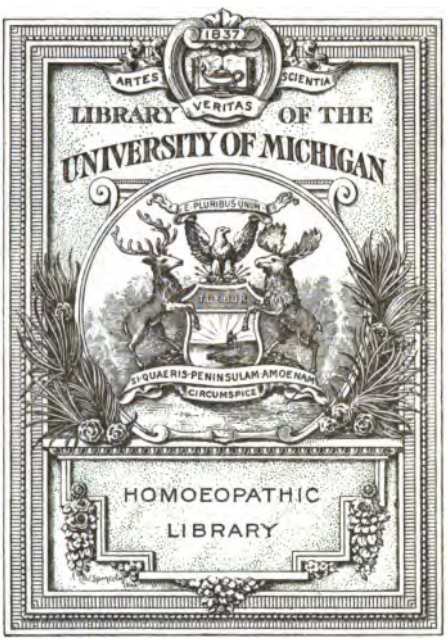
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MODERN DEVELOPMENTS IN MEDICINE.

BY

EDWIN A. NEATBY, M.D.,

AND OTHERS.

(Reprinted from "The Monthly Homœopathic Review.")

LONDON: E. GOULD & SON, LTD., 59, MOORGATE STREET, E.C.

1906.

PREFATORY NOTE.

THE Presidential Address and two papers with discussions following, which form the contents of this small volume, were read at the meeting of the British Homœopathic Congress held in London in July last. They are reprinted from the *Monthly Homœopathic Review*, and published in the present form by request of the members of the Congress, and other subscribers whose names are appended hereto. The photographs are added as a souvenir of the interesting occasion mentioned. The aim of the volume is to circulate as widely as possible the view that modern developments of research in bacteriology and physiological chemistry in their bearing on general biology and practical medicine are confirmatory illustration of the operation of the single principle or law known as homœopathy or "similia similibus curantur." At the request of the Council of the Congress the volume has been prepared for the press by Dr. Goldsbrough of London.

August, 1906.

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EDWIN A. NEATBY, M.D.,
President of the British Homœopathic Congress, 1906.

MODERN DEVELOPMENTS AND THEIR BEARING ON HOMŒOPATHY.*

By Edwin A. Neatby, M.D.

Physician for Diseases of Women, London Homœopathic Hospital.

My first duty to-day is to make acknowledgment of the honour that my medical brethren have done me in electing me to the proud position of President of this Congress. It is twenty-three years since I first attended one of these assemblies, at Matlock, under the presidency of a veteran not long after gathered to his fathers—Dr. Moore, of Liverpool. In thinking of the presidents of subsequent meetings, a long list of honourable names rises to one's mind, a few of whom, such as Charles Harrison Blackley, Henry Harris, and Eubulus Williams, we shall, alas, see no more, but their memory is ever green. The rest are happily with us to this day.

As the years roll by, the traditions and history of these annual gatherings add dignity and lustre to this office, and the mantle of past occupants falls with an ever-increasing weight of responsibility on the shoulders of the new comer. Nevertheless, I thank you, ladies and gentlemen, for placing me here, and I shall do my best to occupy this Chair which others have so nobly filled. I shall not count in vain on the support of the officials and members of this Congress in endeavouring to make it worthy of the past, and of the important papers we shall have to discuss later in the day.

It is a pleasure to acknowledge at the outset of the day the courtesy and kindness of the Board of Management of the Hospital in inviting us once more to conduct our deliberations under this roof. I am sure I shall voice your feeling if I, on your behalf, here and now tender them

*Being the Presidential address delivered at the British Homœopathic Congress, held in London, on July 6th.

our thanks. In doing so I cannot forbear referring to a familiar figure who was with us here on the last occasion we were thus met, I mean Mr. G. A. Cross, an ardent friend and faithful secretary to this hospital. For many years he was the representative of the Board of Management in welcoming us at these Congresses. We shall miss him to-day.

Among our own ranks the Reaper whose name is Death has been busy gathering in his sheaves. Just two years ago, on the first Friday in July, 1904, Robert Ellis Dudgeon sat on the front bench with us. Though he was ailing, yet eighty-three years had not dimmed his vision, and nought but the cold hand could quench the merry twinkle of his youthful eye. Alas, it was the last time he appeared in public, and, indeed, the last time he left his house, until carried out by his mourning friends. Our hearts are still sore as we think of him; we shall hear his voice no more, but his life work is still with us, and by it, "he being dead yet speaketh." At our Congress in September last year, we were cheered by the genial presence of our friend Dr. E. J. Hawkes. His musical talent, as often before, contributed to the enjoyment of our after-dinner entertainment. The silver cord which bound him to us has been loosed. He was cut off without warning, and the world has lost a good man, his patients an able and sympathetic physician, and homœopathy a loyal supporter.

* * * * *

A learned law Lord at a public meeting not long ago said that the duty of a chairman, like that of the small child of a past generation, is to be seen and not heard; such a position of *otium cum dignitate* would admirably suit my disposition, but it would perhaps hardly be respectful to the kind friends who have placed me here.

The inaugural meeting of this Congress, like that of many other similar bodies, is a joint or mixed gathering, consisting of professional and non-professional men and women. This fact must excuse the mixed and sometimes prolix nature of the remarks I have to offer.

It has been a custom at these Congresses to review our position, and to see how we stand with regard to prevalent thinking and teaching in the dominant school. Are the two schools—for unfortunately we must still

speak of two—approximating in their views and practice, or diverging? If they are approximating, is it by a consentaneous movement of the two parties, or is it one only which is drawing nearer the other?

Let us, in approaching the subject, first consider a feature in general pathology, viz., the views which have prevailed as to the constitutional or local nature and origin of certain diseases. In the late seventies of the past century, when my own interest in medicine was dawning, the profession of the day was engaged in discussing the nature of cancer. Sir James Paget was the exponent of the doctrine of its constitutional origin. "Cancers," he wrote,* "are manifestations of certain specific and morbid states of the blood, and in them are incorporated peculiar morbid materials which accumulate in the blood, and which their growth may tend to increase. . . . The morbid material is the essential constituent of the cancerous diathesis or constitution."

On the other side is the late John Eric Erichsen, of University College and Hospital. In the seventh edition (1877) of his excellent and charmingly-written *Science and Art of Surgery*, he sums up a lucid, critical survey of the subject in the following words: "I think we may fairly conclude that (1) Cancer is primarily a disease of local origin; (2) It is often occasioned by the direct action of local causes; (3) It is predisposed to by various local conditions, physiological as well as anatomical; (4) Like all other local conditions it is under the influence of age, sex, habit of body, and hereditary constitution; (5) Although once originating locally, its development is favoured by constitutional conditions; (6) There is no evidence of the existence of any constitutional state that can primarily, *per se*, and independently of any local cause, functional or organic, develop a cancer." With the lapse of time the local theory has taken more strongly hold of the mind of the great body of the profession, and constitutional conditions have been made light of. This feeling is represented in the field of treatment by an increasing tendency to radical and extensive operation for the removal of the growth, with a pessimistic

* *Lectures on Surgical Pathology*, 1876, pages 779, 780.

helplessness and hopelessness as regards constitutional therapeutics. It is only quite recently, with the spread of bacteriological knowledge, that here, as elsewhere, the part played by the constitutional or protective forces of the body is coming once more into prominence. This protective power was known to Hahnemann as "vital force." Had he lived to-day he would have used an expression in keeping with the attempts of the age to find a material basis for natural phenomena. His followers may not all use his old time—indeed time-honoured—expression, "vital force," but the majority of them recognize that there is a something—call it dyscrasia, diathesis, constitutional predisposition, or what you will—lying behind most chronic diseases, with localized manifestations. In the time of Hahnemann the differentiation of tumours was but little advanced, and he does not distinguish between cancer and other new growths of chronic nature. A much more recent writer on the homœopathic side* says, "The essential cause of cancer in any part of the body is not understood . . . heredity unquestionably constitutes a predisposing cause. . . . The appearance of the disease in successive generations is not an assertion, but a fact, and the readiness with which, in some persons, slight local injuries assume all the features of malignancy, can only be explained upon the assumption of a hereditary predisposition." The late Dr. Compton Burnett voices the sentiment of a considerable number of Hahnemann's followers, when he states, "The organism grows tumours vitally, and anything that is to *cure*, really cure, must bring back the perverted vitality of the part to the normal." We see then in the space of less than fifty years the prevailing feeling of the great body of the medical profession with respect to cancer has varied from a strong belief in its constitutional cause to a firm conviction of its local origin, and is now turning again to its previous belief in the importance of the part played by the constitution.

In the case of pulmonary consumption the same thing has occurred. It is unnecessary to quote largely. Fifty years ago Laennec's teaching held the field, that tubercles

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* *Practice of Medicine*, by H. R. Arndt, page 794.

were deposited in the lungs from the blood. How they got there was not evident, but it was assumed that they were there "formed from some constitutional vice or defect or impurity." Later came the view of Niemeyer of Tübingen, that tubercles resulted from unabsorbed inflammatory deposits entering the blood "by a sort of internal inoculation," and giving rise to a crop of miliary granulations—a step in the direction of a local source. Finally, for a short time, when the existence and etiological agency of the tubercle bacillus had been established, and the belief in the efficacy of the open-air treatment was at its zenith, it was denied that phthisis was in any sense originally a constitutional malady.

While accepting any reasonable hygienic measures growing out of pathological theories of this disease, the Homœopathic School has throughout held to the notion that consumption is a constitutional disease. For this disease, as for most others not of a mechanical or traumatic origin, it has held that the "constitution," the general health, or the resisting power of the tissues, was the predominant partner. During the last two years it has watched the pendulum swing back quite decidedly towards the old view, and is witnessing a new therapeutic appeal being made to the resisting protective powers of the body. In the words of another, "the methods of treating tubercular disease by the internal administration of antiseptics have been practically everywhere laid aside in favour of methods which are, at least in intention, methods for building up the constitution, and for the increase of its defensive powers."

Permit me one other instance—that of diphtheria. Most of us are old enough to remember the discovery of the Klebs-Loeffler bacillus. Prior to that date, diphtheria was regarded as a blood disease with a local efflorescence. Immediately after that, its origin in the throat filled the field of the mental vision of the profession, and local disinfection (with brandy as a tissue stimulant) was the favourite treatment. Preventive measures became more and more stringent and precise.

Metchnikoff, the renowned discoverer of phagocytosis, and the director of the Pasteur Institute in Paris, is the

most recent exponent of modern hygiene based on bacteriology. In a recent lecture in this country, he said, "For a long time the ideal of hygienists was to preserve man from all contact with the germs of infection, just as one was wont to preserve organic matter, by placing it out of the reach of microbes. It was not until later that it was recognized how exaggerated this view was." "Quite often," he says, "we meet with cases where the living body remains intact, in spite of its containing pathogenic microbes. Not very long ago quite the contrary was thought to be the case. When Loeffler first found diphtheria bacilli in the throat of a healthy child, doubts arose in his mind as to the etiologic *rôle* of his microbe. Latterly it has become generally acknowledged that a man may be the host of diphtheria bacilli, cholera vibriones, or other pathogenic bacteria, without necessarily developing the corresponding diseases."

Long before his death Pasteur showed that animals immune from a certain form of disease could be rendered sensitive to it by placing them in unfavourable surroundings. A fowl, ordinarily immune from anthrax, could be rendered susceptible by lowering its (naturally high) temperature. More recently, Vincent has shown that a guinea-pig rendered immune from tetanus could be infected after being placed in too high a temperature.

German investigators have proved that long after recovery from an illness, patients may be sources of infection, while themselves well and immune—such persons are styled *baccillenträger*—carriers of bacilli.

These facts are interesting enough in themselves and historically. It is, however, because taken together, they appear to me to tend to reinstate to its lawful place the importance of the constitution, or disease-resisting forces of the body, that I have placed them in the front of my remarks.

For a time, in the general body of the profession, as local anatomical changes became understood, and as local bacteriological influences were recognized, the counterbalancing body forces were either lost sight of or relegated to a very secondary place. It is striking that this has not been the case with those followers of Hahnemann who have written best and thought best during the last

thirty or forty years. The rule of similars does not teach pathology, nor are believers in the principle tied to or bound down by any pathological dogmas. But there can be no doubt that the possession of an effective therapeutic rule has steadied, if not guided, the pathological thinking of homœotherapeutists. This salutary influence has justified the striking expression, first used, I believe, by Dr. Dyce Brown, "The *reign* of law in medicine"—in other words the existence of the law in therapeutics has demonstrated its reign or dominating influence even in a collateral branch of the medical sciences.

Turning now from general pathology, I invite your attention for a few moments to one of the main stumbling-blocks in the path of homœopathy—the question of the dose. Do not suppose that I am going to discuss what is the correct dose for any given medicines, or to plead in favour of high or low dilutions. In the mind of an enquirer who hears marvellous tales of the results of minute doses applied homœopathically, the question at once arises, "Can such things be?" If *that* enquiry be satisfactorily answered, there still remains the query for us all, "*How* can these things be?" and this is less easy to answer. The answer to the first is "*Fiat experimentum*"—test it and see.

Starting with the most elementary position possible, we may lay it down that there is no *a priori* rule or probability why one quantity of a drug and not another should have a poisonous or a curative effect. We know by experience alone that an ounce (480 grains) of Epsom salts in water may be a harmless beverage to a man who would be poisoned by one-hundredth of a grain of aconitine, and that the same man might be cured of certain conditions by one-thousandth or one-millionth of a grain of the last named.

These are matters of common knowledge based on experience. Experience then—or in other words, fact—is what the scientific mind asks for, and not probabilities, reasonable or unreasonable. This experience any open-minded man can have for the asking as regards the curative effects of minute doses of drugs selected on the rule of similars. But for those who cannot, or will not, make the proof for themselves, are there any well-known facts

whose analogy makes it easier to accept those less well known? From the early days when the perpetual scenting of a room by a grain of musk was a leading argument, facts have been accumulating to show the power of infinitely small forces or quantities in nature. Later on came such facts as those narrated by Dr. Moir in his presidential address in 1899, recalling some experiments of Darwin, who "distilled one litre of water in glass retorts, suspended four clean copper coins in this water during four days, and found that this solution killed his plants in a few minutes. When this water was poured away, the glass rinsed and washed carefully, and again refilled with neutral water, plants still died in a very short time. If, however, the glass was washed out with diluted nitric acid, and refilled with fresh neutral water, plants flourished and remained healthy. Again, he found that this oligodynamic water poured into a new clean glass transferred its poisonous properties to the walls of the glass, and in turn was again able to medicate neutral distilled water. Naegeli gave the name of oligodynamis, or 'the power of the minute,' to this poisonous property which exists long after all chemical trace of the metal has been lost." Such action lies between a proportion of copper of one part in a hundred million parts of water and one in a thousand million parts of water.

If it be recognized that science has demonstrated that a proportion of one in a thousand million parts of water can have a tangible effect, it really is hardly a matter for surprise that an infinitely minute quantity of matter is required to influence portions of protoplasm so small as the biological unit of life—the organ-cells of the body. Dr. Robin, of Paris, an experimenter and orthodox physician, has "discovered" that "almost infinitesimal quantities are endowed with very great activity." He has shown for instance that solutions of gold, corresponding to about the fifth decimal dilution of our system, produced such positive results as the following:—*

1. An increase in urea, which may rise as much as 35 per cent.

2. An increase in the co-efficient of nitrogenous utilization.

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* See Dr. Copeland, *Med. Century*, April, 1906.

3. An increase in uric acid which may reach high figures, as much as three times the initial quantity.

4. A positive flush of urinary indoxyl.

5. A decrease in the quantity of total oxygen consumed.

6. A temporary raising of arterial tension.

7. A profound modification of the blood globules. An injection is followed after several hours by manifest leucocytosis, slight in a healthy person, intense in infectious disorders habitually associated with leucocytosis; decrease in the number of leucocytes begins in an hour or two, and lasts for a period of time varying from one to two days. The red corpuscles do not seem to undergo any noticeable modifications.

Robin then goes on to say that these results show the possibility of assimilating metals in a condition of extremely diluted solution, their action being similar to organic diastases. "In the above-mentioned solutions," he says, "the atoms of the metal, separated as widely as possible, are, as it were, liberated, autonomous in their activity, and susceptible in this way of developing greater energy. . . . It is not difficult to conceive that these simple bodies, even in the infinitesimal doses in which they are found, are capable of influencing the chemical reactions of elementary nutrition."

After referring to the results obtained by the use of gold in minute doses in pneumonia, which he claims in six cases out of ten produced a crisis in six days, he draws the following conclusions from his experiments:—

"1. That metals in extreme subdivision are capable of remarkable physiologic action out of all proportion to the amount of metal used.

"2. That such metals, acting in doses which therapeutics considered heretofore as ineffectual and useless, by making a profound impression on some of the chemical processes of life whose deviations are connected with many morbid conditions, are probably destined to take an important place among the remedies of functional therapeutics."

As far as present knowledge goes the most marvellous evidence of the power of immeasurably small quantities of matter is obtained in connection with radio-active bodies. This was referred to two years ago from this

chair by Dr. Burford; it will bear repetition. Becquerel, in 1896, found that uranium emitted rays capable of penetrating a wooden or paper envelope, and of affecting a photographic plate. On further investigation he discovered this effect was not the mere out-giving of rays absorbed from the sun-light, as is the case with calcium sulphide, but was inherent in the uranium itself, existing when the mineral had never been exposed to the sun's rays. Monsieur and Madame Curie isolated this substance from pitch-blende, and by fractional distillation obtained pure radium bromide. "It was soon found that if a current of air were allowed to pass over radium it carried away something that could display the properties of radium itself, making willemite and other minerals luminescent, and ionizing the air in its neighbourhood so as to make it a conductor of electricity. This material can diffuse through gases and porous material, can be condensed by cold and re-evaporated by warmth; and can, moreover, be deposited upon the surface of any material object exposed to the air which contains it, and can afterwards be removed from that surface by friction or solution, and still display the properties and powers characteristic of radium." It is clear, then, that *a portion* of the radium has been carried away by the current of air. "A portion" —but how minute a portion!—when, though it gives out "a constant stream of substantial material for years, the radium itself does not grow the smallest perceptible fraction of a gram lighter than it was before."

If this emanation be heated, and a bubble of gas not larger than a pin's head be evolved and mixed with a million million times its bulk of air, the mixture still possesses the properties of radium. Even this diluted emanation yields a solid deposit, so little as to be invisible even under the most powerful microscope, but, nevertheless, capable of rendering surrounding bodies radio-active.

In the words of Professor Strutt of Cambridge, "there lies latent in every atom of this emanation from radium a quantity of energy absolutely gigantic."

We have reached a point where the scientific instruments of the most refined order refuse to take us further. Thus radium emanation* breaks down, and its final product

* Dr. Hampson's, *Radium Explained*, page 15.

is said to be "inactive." The microscope, the spectroscope, and the electroscope, all fail to follow it. But is it destroyed? One day a still more sensitive "scope" will be discovered, and the power of still higher infinitesimals ocularly demonstrated. In the meantime who can deny that the cells of the human body may be electroscopes of a higher order than any manufactured by the scientific instrument maker, and capable of appreciating and reacting to those imponderable and immeasurably small substances, and the forces they represent? We need not seek further for evidences of the power of the infinitely small.

All science is recognizing their momentous importance, and one writer has gone so far as to say, "the smallness of a thing is often an inverse measure of its importance." (Duncan, *The New Knowledge.*)

We now come back to the question, "*How* can these things be?" In endeavouring to *explain* the action of these infinitesimal quantities two features must be taken into consideration, viz., subdivision and movement.

First as to subdivision: the stock illustration of inert crude mercury and the smart action of a few grains of the same triturated with chalk or milk sugar, forming "grey powder," is familiar to every one. An equally rough and ready example is furnished by the yule log put on to a few dying embers with the effect of more rapidly extinguishing them. If the log be sub-divided and a few minute shavings with a penknife be scattered on to the fast disappearing fire, it will be saved. One of the effects of this subdivision is to increase the coast-line or surface of the wood (and the mercury). The number of molecules or atoms capable of acting upon or being acted upon by surrounding atoms is by this means enormously increased. Let us see what is the effect of such subdivision in another region. Nowhere is it more strikingly seen than in the investigations of Clark Maxwell and Lebedew as to the mechanical pressure of light. "Suppose we divided a sphere, such as a cannon ball, into eight equal spheres. The sum of the surfaces of these eight spheres would be twice that of the original sphere, while the weight, and therefore the gravitation pull, would remain the same. If we continued the process of division until the spheres

were the size of the smallest shot, the total sum of their surface would be enormous compared with the original sphere, while the weight would again be only equal to that of the cannon ball. If we continued the division on and on we should eventually come to a body so small that the ratio of its surface to its weight would be enormous—it would be almost all surface. Now the greater the surface, the greater the effect of the light-pressure, and hence, without going down by any means into infinitesimals, the process of division carries us to a particle so fine that the light pressure will exactly balance its weight. This is the case with a particle of earth one one-hundred-thousandth of an inch in diameter. Such a particle would neither be attracted to nor repelled from the sun, for the sun's pull upon it is exactly balanced by the repulsive force of the sun's light. If the particle is smaller still it is repelled from the sun, and, in fact, if the particle is exceedingly small the light push may enormously exceed its weight." In 1901 Peter Lebedew proved and measured the mechanical pressure of light, demonstrating that it equals a milligram on every square metre of the earth-surface. This discovery explains a phenomenon up till then veiled in obscurity, namely, why the tail of a comet usually points away from the sun, but occasionally towards it. It would be anticipated that the tail would be drawn towards the sun by gravity. But the particles of the tail are so fine, and consequently the surface acted upon by the light-pressure is so great, that its effects exceed that of gravity, which acts in proportion to weight. When the particles are larger than can be repelled by the sunlight, they will form a tail pointing to the sun.

So much then for the effect of primary subdivision in another department of science. The particles thus far referred to measure from $\frac{1}{10}$th of a micro-millimetre to six micro-millimetres.

Let us now refer to subdivision carried further—what I may call secondary subdivision—that due to the breaking up of atoms into their component ions. As to their relative size, these bodies are a thousand times smaller than the smallest hydrogen atom. Actually their weight would be represented by a fraction of a gram in the twentieth place of decimals. These are actual fragments of the matter

from which they fly. This leads us to the second principle referred to as common to matter viz., movement. These particles, as they fly off, are the basis of radio-activity. The speed of the particles formed by a disintegrating atom is variable, but the slowest of them is estimated to travel more than a thousand times faster than the swiftest cannon ball. In fact, their velocity varies from 10,000 to 90,000 miles per second—reaching nearly half the velocity of light. The β-rays of radium travel over 100,000 miles per second—a velocity enough to carry them five times round the earth in one second. This property of radio-activity is found most developed in radium. "The emanation from a gram or two of radium chloride *when liberated by solution* is capable of illuminating brightly a screen of zinc sulphide for days at a time; and yet this rapid emission of energy arises from a quantity of gaseous matter, hundreds of thousands of times beyond the power of the most delicate balance to detect. Professor Rutherford has calculated that if a thimbleful of this active gas could be collected, the bombardment of its powerful rays would heat to a red heat, if it would not melt down, the walls of the glass tube containing it."

Not only does radium give off the active bodies or particles, but so do glowing metals, and incandescent carbon gas flames. Moreover, many ordinary substances, *e.g.*, glass, tinfoil, zinc, copper, silver, lead, aluminium, and platinum, are to some slight extent radio-active. Finally, it is held that radio-activity exists everywhere over the earth's surface, though in a minute degree, and the heavier the element, the more likely is it to be radio-active.

The generalization is arrived at that: "These little bodies are invariably associated with matter and arise from matter —from *any form of matter under special conditions, and from special forms of matter* under any conditions."

Now what have all these facts to do with the giving of small doses of drugs? Let us see: (1) The universe is full of facts showing the power of infinitesimal quantities of matter. (2) Subdivision has been seen to render the log of wood capable of yielding up its latent energy in the presence of slight heat—the dying embers. These dying embers act the part of a liberator of energy. Heat does this in the steam-engine. A clock transforms the

power we put into it in winding up the weight or spring; in a steam-engine the power is not the result of the shovelling and mining of the fuel, but of the liberating of the combining energy of the coal and oxygen. Similarly, the grinding up or dissolving of a medicinal substance subdivides it —like the penknife or adze does the log. The finely divided particles are brought into contact with living cells which act the part of liberators of the latent intra-atomic energy. Such liberation of energy goes on everywhere, under all circumstances. How much more favourably when subdivision renders possible ionization by the tissues. Steam molecules can be shattered by heat. Why should not the body cells decompose the atoms of finely divided matter, and liberate its intra-atomic forces? When liberated, why should not each of these particles, moving, as we have seen, with an infinite velocity, be capable of modifying the life and health of cell protoplasm—itself in a state of constant regular movement or vibration? A gram of hydrogen has "within it energy sufficient to lift a million tons through a height considerably over a hundred yards," and the energy of heavier "elements, such as sulphur, iron, or lead, must enormously exceed this amount." A very infinitesimal part of this will suffice, therefore, to modify the life-processes and reciprocal vibration of our body-cells. As regards the preparation of homœopathic medicines by trituration and solution, it is not contended that the drugs are ionized, but that their minute subdivision renders them capable of ionization by the tissues. Nor is it necessary to suppose that before administration drugs are ionized. For the molecules of any substance are constantly being disintegrated into their atoms, the atoms re-uniting to form new molecules with fellow atoms. There is thus a moment of time when the atoms are free from molecular association. It is here that the opportunity of living cells of the body may be supposed to come in, and that they may seize upon these small atoms (or possibly ions) for their own purpose. The opportunity of free molecular vibration also comes in here. The blows they can strike vary with their speed, and the increase in forcibility varies, not in proportion to their velocity, but to the square of their velocity. In simple language: suppose three boys are

throwing stones, and the second throws twice as quickly as the first, and the third three times as quickly as the first. The stone of the second will strike, not twice, but four times as forcibly as the first; the third, not three, but nine times as hard as the first. If one compares the speed of a flying bullet—say at the rate of a mile per second—with radium particles travelling and striking thirty thousand times as quickly and forcibly, the unthinkable fact is arrived at that radium particles strike weight for weight nine-hundred-million times as forcibly as the bullet.

Our knowledge of cellular physiology and cellular pathology demands a cellular therapeusis, and in this domain bulk gives place to speed. Herein lies the scientific justification of the clinical use (long verified by experience) of minute doses of finely subdivided substances.

The concluding section of my address will deal with therapeutics, and I shall endeavour to answer the enquiry, how far the most striking developments in the last two or three years in "orthodox medicine" fall into line with the teachings of Hahnemann. The preface to the Review of Therapeutic Progress, in 1905, in the *Medical Annual*, says: "The past year has been a singularly uneventful one from a therapeutic point of view. . . . A new drug has been introduced which *may possibly* prove of value." How different is this language from the authoritative pronouncement of Hahnemann, when from his retreat in Coethen he prescribed for cholera, guided by the rule of similars, without having seen a case.

Of the "newer" remedies in the *Medical Annual*, I may mention barium chloride—our baryta mur.—used in valvular heart disease and acting especially on the muscular wall of the arteries; Cactus grandiflorus—"in every way superior to digitalis"; Echinacea angustifolia for "blood poisoning in all its forms"; hydrastis can. for catarrhal dyspepsias, catarrhs of various mucous membranes and for menorrhagia. These are samples of unacknowledged homœopathy. Another instance of a more interesting kind is the use of certain lime salts for urticaria and various skin œdemas, and for deficient coagulability of the blood, with or without hæmorrhages. These are cases in which homœopathy has long been prescribing calcarea. The

possibility of estimating by methods of precision the effects of the drug is a distinct advantage and advance which we gladly acknowledge.

Here I may be permitted a digression on a subject familiar to all medical men, but less so to the non-medical world. One of the hindrances in the way of enquirers into homœopathy is the difficulty of offering an *explanation* of the *action* of drugs prescribed homœopathically. Homœopathy furnishes a rule of drug selection, not an explanation of drug action. Whatever changes of views may take place as to the explanation of the mode of action of a drug, they will not vitiate the rule of selection. Perchloride of mercury, advocated by Ringer in dysentery, is *selected* by followers of Hahnemann because in poisonous doses it causes enteritis resembling dysentery. When this drug was struggling for recognition in old-school hands, it was denied that its use had anything to do with homœopathy, because, as was asserted, it was an antiseptic or bactericidal agent. If it were true that it cured by killing bacteria, it would in no way invalidate the reliability of the law used in guiding the seeker to it. As a fact, it was proved that the benefit of merc. corr. in dysentery was not due to its bactericidal properities, for it cured in doses far too small to kill bacteria, and other bactericidal drugs do not have the same result. To-day it may be said that the drugs act by stimulating the serum to develop an antidotal substance, or the leucocytes to greater phagocytic action. This may or may not be a correct explanation, but in either case the rule of selection remains valid. Is it strictly correct to speak of homœopathic action at all? I think not. If a drug is bringing about the cure of a disease, it is obviously acting as an antidote. The *choice* may be homœopathic, but the action is an "anti"-action. So, in the celebrated parallel drawn at a recent Congress, by Dr. Johnstone, between the treatment of eczema and diphtheria; in each case an agent capable of causing a similar condition is *chosen;* arsenic in the one case, a bacterial toxin in the other—a selection on the principle of similars. In each case an *opposing* action takes place, generating in the one instance an antidotal effect or substance (so far unnamed), and in the other an antitoxin. That the anti-body is in one case developed

in the body of the sufferer, and in the other in the body of a horse; and injected into the human victim, is of no consequence.

Calcium salts cured cases of urticaria, œdema, and hæmorrhages if selected according to the rule of similars before physiological chemistry ascertained that they increased the coagulability of the blood, and will continue to do so if this explanation be abandoned for a newer. Moreover, the rule will guide to a far wider group of cases than can be explained in this way, and the dose used with the homœopathic principle of selection in view will result in a far more permanent cure. Moreover, it will be much easier to attain to the conditions necessary for success demanded by Professor Wright in his article in the *Lancet* of Oct. 14, 1905. "Success," he says, "in maintaining the blood coagulability at a high level involves adjusting successive doses of calcium salts in such a manner as to avoid introducing into the blood such excess of these salts as would effect a retardation of blood coagulation time." In other words, a drug is used which, when given in excess, produces the very conditions you are seeking to cure. So that, however often the advance of knowledge necessitates a change of explanation of the action of a drug, the rule of its selection—the homœopathic rule—will hold good.

The last and the greatest development in the domain of therapeutics in the dominant school is the treatment by products of the disease from which the patient is suffering. Now perhaps, at first hearing, this sounds an unpleasant, unclean method of treatment. A few words will suffice to show that it is not so. The disease products referred to are the poisons manufactured by certain very low forms of vegetable life, which grow in a variety of suitable media, of which some parts of the human body, under certain conditions, form one. Although the site of their growth and development is our own body instead of the bosom of mother earth, bacteria are vegetable substances, as are aconite and belladonna. The poisons produced by the latter are preserved in spirits of wine, the former in glycerin or salt and water. The latter are more often given by the mouth, though atropine is very frequently given subcutaneously. The former usually

by the hypodermic method. The one is termed a tincture, and the other is called (for no etymological reason) a vaccine, though it has little in common with vaccination, and nothing to do with a cow.

The use of disease products as therapeutic agents is no new thing. I should trespass on the ground of the reader of a paper later in our programme if I entered into details as to its history and development. Suffice it to say it was known to Hahnemann; it has been brought forward and allowed to drop again by some of his disciples, from Constantine Hering to Compton Burnett.

During the lifetime of Hering it was utilized by Lux, a veterinary surgeon of Leipzig, in the year 1833, and regarded by him as isopathy. He said: "All infectious diseases contain in their infectious matters the remedies capable of curing themselves." "The principle upon which these remedial agents act he contends to be æqualia æqualibus"* This principle is referred to with approval by Bulloch in the *Practitioner*, November, 1905, page 598, who states that the use of tuberculin in tuberculous conditions, and staphyloccin (to coin a term) for boils, are typical examples of the isopathic doctrine of "æqualia æqualibus." The diseases for which this principle of treatment has been recently used by Professor A. E. Wright and others, are lupus, tuberculous disease of the joints, bones, glands, kidneys, bladder, lungs, etc., acne, crops of boils, leprosy, plague, and finally even cancer. Indeed, provided you can catch and cultivate the micro-organisms present in the disease, it seems as if it were hardly necessary to know the name of the disease or of the microbe! Hering and his immediate successors knew nothing of bacteriology. They diluted the virus, poison, or secretion of the diseased surface or organ with alcohol to such an extent that all idea of want of cleanliness is excluded, whatever the source. Indeed, the employment of bacterial emulsion, even if sterilized, is less appetizing than a few drops or grains of a high dilution of a nosode. Modern authors cultivate, sterilize, and count their bacteria, and measure the resisting power of the body, by estimating the degree of phagocytosis of which the leucocytes are

* Dudgeon's *Lectures on Homœopathy*, lecture vi. p. 150, 1854.

capable. Had Hahnemann and Hering been alive in the days of culture-media and microscopes they would have done the same. All honour to the genius of Professor Wright, who has placed on a new foundation the old use of nosodes. He has shown that the blood fluids produce protecting substances which favour phagocytosis–substances called opsonins, and he has found that these opsonins may be increased by the injection of some of the toxins of the various diseases. He has enabled us to measure the opsonic power. We gladly accord him the credit which is his due, and will follow in his steps and perfect his methods. His discoveries *explain* much that was obscure, but the *principle* of his treatment is older than this generation. Even if Hahnemann did not advocate this so-called isopathy, many of his followers have supported the doctrine. In all probability every isopathic remedy so-called is a homœopathic remedy. Two isopathic agents must be of identical chemical composition and physical properties; indeed, must be two portions of the same substance, such as arsenic or atropine. A mere equality of the number of molecules of certain elements is not enough to form identity. There are a dozen well defined hydrocarbons all having ten molecules of carbon, and sixteen of hydrogen, and known as the terpenes. Some are liquid, one is solid, and most are unstable and volatile, but they have different physical properties and different names. Though the same in number, the arrangement of the molecules is different. I have, therefore, intentionally stated that both chemical and physical identity must exist in the case of isopathic agents. Any modification of such composition and properties alters the substance from an idem to a simile. The effect of the additional dose of an idem, however small, given during the attack produced by the first, can only be to increase the effects of the original dose. A real idem *must* have this effect. But it seems to me not to require much effort to show that this so-called isopathy is really and truly homœopathy. Let us take as our example tubercle bacilli and tuberculinum. The former are living organisms, capable of multipling and of secreting or excreting poisons varying in their effects with the host or organ in which they are found. In the case we are supposing, their home is the human

tissues, from which they derive their nourishment, and in which they are facultative as regards oxygen. To form tuberculinum these same bacilli are taken from their home, or growing ground, and are cultivated in a strange medium —say on glycerin-agar or potato—and are always exposed to the air. The bacilli are next sterilized—rendered incapable of multiplying or of forming in the tissues fresh toxins than those already formed in the artificial culture media. The bodies are either broken up, as in the case of Koch's new tuberculin, by thorough trituration, or, as in the case of Jacob's tuberculin, are filtered out through a Pasteur's filter. Moreover, the bacilli, before being heated, are mixed with salt and water, and after being heated they are usually diluted with weak lysol or other similar agent. I submit that these processes are sufficiently considerable to modify the original substance and to cause it to have a different, non-identical but similar action. The dictum of Metchnikoff on a kindred subject supports this view. In a lecture recently delivered at King's College, he said, "Phagocytes do not behave in quite the same manner outside the body as they do in their normal surroundings and under natural conditions." It is a fair assumption that this is true of bacteria also, and it appears a work of supererogation to endeavour to prove that living organisms differ from dead ones. Indeed, Klein has shown that a much greater quantity of dead bacilli from cultures possess smaller toxic effects. The question is raised by Professor Wright in his work on anti-typhoid inoculation (page 6), as to whether it is necessary, in order to ensure a supply of anti-tropic substances in the blood, that "the chemical basis of the formed element (*e.g.*, bacteria) should be introduced into the organism in an absolutely *unaltered** condition." (This would be isopathy proper.) "Upon the answer which this question receives, will depend the scientific justification for the employment as vaccines of bacterial cultures which have been chemically *altered* by heating or by other agency." His answer is that it is not necessary that the tropines be "absolutely unaltered"—that the identity be preserved. A modification is permissible,

* Italics are mine.

for example, by heating the cultures, but it is "manifest that a *departure* from . . . the original culture is admissible only so far as it proves itself to be a modification which leaves unaffected that chemical element in the vaccine which evokes the elaboration of destructive antitropic substances." A modification then, so far as to produce a similarly acting agent, is permissible; we should say more, viz., that it is essential. That an increased dose of an unchanged tropine is harmful scarcely requires proof. This is evidenced by the constitutional disturbances produced when an auto-inoculation has taken place in tuberculosis of the lungs. When, moreover, the toxin of one disease is administered to combat another disease, on the ground that the two diseases are so similar, all question of identity or isopathy is absent. Of this practice the use of tuberculin for leprosy is an illustration, a procedure quite recently re-instituted with good promise. The same principle of similarity governs the administration of diphtheria antitoxin in scarlatina. A writer in the *British Medical Journal* (February 17th, 1906) says: "I have also administered diphtheria antitoxin to nearly all severe cases of scarlet-fever that have been in charge during the past two years, with results that surprised me by their excellence." There is no need to recapitulate the points of similarity in a severe case of scarlet fever and one of diphtheria.

I hope I have succeeded in showing that, at least as regards bacterial vaccines, the principle is one of similarity and not identity; in other words, of homœopathy, and not isopathy.

Can we show any points of resemblance between the dosage of a bacterial vaccine and the dosage of an acknowledged homœopathic remedy or between the behaviour of the two?

1. The dose must be small; from one six-hundred-thousandth to one-millionth of a gram is mentioned by Professor Wright, in the *Lancet* of December 2nd, 1905, and in the *British Medical Journal* a dose as low as one ten-millionth of a gram is advocated by Denys, of Louvain. Larger doses than those of Professor Wright are stated by him not to give such good results. "It seems that the machinery of immunization can be brought into

action by very small stimuli, and that it can be very easily overtaxed."

2. The smallest dose that will elicit response must be used.

3. The dose should be repeated only when the effects of the previous inoculation are passing off.

4. The dose should be increased " only when it becomes clear that the dose previously employed is ceasing to evoke a sufficient immunizing response."

5. An increasing negative phase—" an aggravation," in homœopathic parlance—means too large a dose.

6. The heightened sensitiveness of the organism to similar stimuli during disease is shown by the fact that " small quantities of killed suspensions of tubercle bacilli can produce death in animals already tuberculous " (Bulloch, *Lancet*, December 2nd, 1905), whereas such a dose would have no perceptible effect on the healthy. This explains by analogy how a minute dose of a drug can affect a diseased body (rendered by the disease over-sensitive), and how the bottle of homœopathic pilules can be eaten with impunity when picked up by a healthy child, and yet can be efficient therapeutically. " By reducing the dose to very minute proportions, he (Koch) found in a certain number of cases that the disease can be brought to a standstill."

Having once accepted the principle of treating by products of the same disease—the principle of " inoculation, mostly in attenuated forms, of the etiological agents themselves, or products derived from them " (Bulloch, ibid.)—the application of the principle need not be limited to one or two diseases, or to the use of bacterial toxins. Already the principle is widely applied ; in addition to the diseases already named, it may be mentioned that animals can be rendered immune from plague by small doses of killed plague bacilli, demonstrated by Klein ; typhoid is warded off by antityphoid inoculations, by Wright ; cholecystitis treated by emulsions of *Bacillus coli* (raised from discharge from the gall-bladder of the very patient) ; empyema treated by pneumococcus vaccine.

Not only may antibodies be formed by bacterial vaccines to neutralize the effects of bacterial tropines, but others act against the poisons of highly organized

plants, or even those of animal origin, such as snake poison. Moreover, it has been shown that a drug like iodide of potassium has an influence on the resistance of the blood serum to *Staphylococcus albus*. Ehrlich showed that ricin, a substance derived from castor-oil seeds, agglutinated and disintegrated the red cells, but where progressive doses are cautiously given, an immunizing effect takes place: the red corpuscles are unaffected, the corpuscles of normal blood were unaffected when mixed with a serum of the immunized animal, and it was deprived of all its poisonous properties by digestion with the serum of an immunized animal.

Snake venom similarly induces a venenetropic substance.

Moreover, a non-bacterial poison, in the shape of the snake venom, has been used with good results to neutralize the somewhat similarly acting toxin of the plague bacillus, a use carried out, if not also originated, by our distinguished colleague, Colonel Deane, late of the Indian Medical Service.

May I not venture to say that I have sufficiently proved that the scientific teaching of the present day confirms that of Hahnemann seventy or eighty years ago? This proof is furnished by the best workers in the dominant branch of our profession, though they are slow to confess the homœopathicity of their work. We welcome their proof of our own principles as Hahnemann himself would have welcomed it. Indeed, had he lived in recent years, he would have been the first to furnish the proof. What was his attitude towards the science now known as bacteriology—then non-existent? In 1831, he wrote (page 851 of the *Lesser Writings*, Dudgeon's translation): "On board ships, in whose confined spaces, filled with mouldy, watery vapours, the cholera-miasm finds a favourable element for its multiplication; it grows into an enormously increased brood of those excessively minute, invisible, living creatures so inimical to human life, of which the contagious matter of the cholera most probably consists." And again (page 853), "The miasm . . . the invisible (probably animated) and perpetually reproductive contagious matter. . . . . "

Had Hahnemann possessed Pasteur's microscope and laboratory, the latter would have been a disciple instead of a master in bacteriology. For Hahnemann was as

keen an observer, and was hot on the trail without any of the facilities of Pasteur.

Lest my thesis be obscured by a multitude of words, let me sum up: I set out with the hope of showing that modern developments in medicine and science are not at variance with the teachings of Hahnemann three-quarters of a century ago, or with the chief beliefs and practices of his followers of to-day.

I pointed out to you that during the last thirty years or so, fluctuations in the views of the general body of the medical profession as to the relative importance of the constitutional and local element in some diseases have taken place, which fluctuations had been avoided by Hahnemann's disciples. I suggested that the rule of similars, though not a pathological law, was nevertheless a steadying factor in our speculative thinking, and that the most advanced teaching of to-day has now come abreast of us.

I next endeavoured to emphasize before this mixed audience, what has been better shown in this room by Dr. Percy Wilde and others before a medical audience, that the discovery of the ionization of atoms renders comprehensible the activity of our finely subdivided remedies; that the rate of vibratory motion of the atoms, or ions, is vastly more important than their bulk; that all physical science is demonstrating the power of minute amounts of matter and forces. It thus becomes evident that it is only a mark of ignorance to scoff at the use of infinitesimal doses. Thirdly, I tried to show that recent remedies, and still more recent principles in treatment, are truly homœopathic. In doing this, while recording first honours to Hahnemann, I do not make the claim boastfully, for I cannot but realize that the new homœopathy of our allopathic brethren, embodies a vast amount of painstaking research and deductive thinking, such as any school may be proud of. Moreover, though it is excellent homœopathy, it is original work for these observers as such, it is of course, the more welcome and valuable to us as corroborative evidence.

Has not such work a moral for us as patients and doctors of the reformed faith? At one of the May meetings this year, the Bishop of Winchester is reported to have said: "The time has come when Christian apologists

should cease merely to defend their faith . . . it is the moment of definite constructive work."

May we not say the same of our own department of thought and action? It is how best to pursue this constructive policy which is occupying the thoughts of our most earnest leaders. It is with this object that this Institution, under whose hospitable roof we meet, is at work in its clinical and its research departments; it is even more markedly the aim of the British Homœopathic Association, of which this room was practically the birth-place. The extension of hospitals flying the flag of therapeutic freedom; the improvement of our materia medica—already excellent and invaluable—on lines of modern precision; the investigation of many problems of disease, and its treatment with the aid of twentieth-century science; these are the constructive measures we are all bound to keep united in supporting, unless our own good name, and the fair fame of Hahnemann, are to suffer. At the present day the clinician, the pathologist, and the therapeutist must pull together and work shoulder to shoulder. None can say to the other, "I have no need of thee:" least of all can the medical profession do without the practical sympathy of the non-medical public in the matter of scientific medical education. It is to them that our teaching bodies and our laboratories look for encouragement and support. Truth is greater than any party, and it is no respecter of persons. If we are not faithful and zealous in the defence and advancement of the truth committed to us, the truth will still prevail.

Not in my own name, but with the authority of this Chair in which you have placed me, I invite you all to be taking some active personal part in the fight for freedom in a therapeutic sense, and the advancement of those departments of knowledge entrusted to us.

Ladies and gentlemen, I thank you for the patient hearing you have given to me. While I recognize that many of yourselves could have dwelt upon these topics with more skill and eloquence than myself, I yield to none in the enthusiasm and, I hope, large-mindedness, with which I enter into the work and progress of our great profession. To those of you who remain with us through the rest of the meetings, I wish a pleasant and inspiring day.

THOMAS G. STONHAM, M.D.

SNAKE VENOMS: SHOWING HOW RECENT DISCOVERIES WITH REGARD TO THEM EMPHASIZE THE PARALLELISM BETWEEN THEIR PATHOLOGICAL AND THERAPEUTIC ACTION.

By T. G. STONHAM, M.D. Lond.*

YOU are all so well acquainted with the therapeutic uses of the various snake poisons, and are so constantly employing them in practice, that I feel the greatest diffidence in addressing this Congress on such a well-worn subject. And indeed, from the standpoint of simple homœopathic prescribing, I should not venture to do so. The symptomatology is abundant, the leading indications are clear, and the whole pathogenesy so striking as to be easily remembered. The symptom list of lachesis by Hering, the introducer of snake venom into homœopathic use, and the splendid monograph on crotalus by Hayward, cover the ground with regard to those two poisons so completely that I do not think anything has been discovered since to add to them, and I am not aware of any new provings having been made of naja and the other less frequently used snake poisons. So that from the homœopathic side I have no new matter to bring forward.

It is curious that while the allopaths have been so busy in appropriating many of our drugs they have left this, one of the greatest, in our undisturbed possession. No doubt the obstacle has been the infinitesimal dose; but there are signs that their prejudices with regard to minute doses is giving way, and I do not think it will be long before we read in the daily press, or elsewhere, of an astonishing discovery made by some brilliant member of the orthodox school, of the wonderful medicinal qualities of snake poison. This is the more likely to

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happen as the physiological chemists and bacteriologists have lately been paying a good deal of attention to the subject in connection with researches on immunizing bodies and antitoxins, and as they have brought to light some facts bearing on the pathological action and constitution of the venom, it may be worth while spending the few minutes devoted to the reading of this paper in considering them.

The snake secretes its venom by means of two glands, answering in position and structure to the parotid glands, and which lie one on each side of the head behind the orbit. They are compressed by the masseter muscles, which compression aids in the ejaculation of the poison. From the front portion of the gland the poison duct passes forwards, runs along the lower margin of the orbit, and opens on the top of a small papilla which is situated at the base of the fang on the anterior wall of a sheath of mucous membrane which closely embraces the fang. The fang itself is a tooth which has undergone a special development, the dentine having sent up lateral plates which, curving towards one another, have united to form a canal down which flows the poison as it leaves the poison duct. The canal stops a little short of the end of the fang. The fang is firmly and immovably fixed to the jaw bone, but is yet very movable, the bone and fang being moved together by various muscles so that the fang either lies quiescent along the roof of the mouth, or is erected when the animal is about to strike.

A medium sized cobra will yield from its poison glands from 150 to 200 mgms. of dried poison, and this quantity, viz., 200 mgms., is sufficient to kill 5000 rats. The reaction of the venom is acid to litmus. Fresh made venom (of all kinds of snakes) is a fluid varying in colour from the palest amber tint to a deep yellow. When desiccated it dries into a cracked mass separating into solid yellow particles, very fragile, bright yellow, transparent or translucent, and seemingly indestructible by time. It can be kept permanently either desiccated or dissolved in glycerin or alcohol. The poison is a very stable substance. Weir-Mitchell says of the poison of the rattlesnake: "Freezing has no effect; boiling has no effect; strong nitric acid, strong muriatic acid, strong sulphuric acid—

each of these strong acids, after mixing with the venom and acting upon it for twelve minutes, was neutralized by liquor potassæ—each mixture when injected into the subcutaneous tissue produced death. When mixed with ammonia, chlorine water, iodine, soda, potash, and each mixture injected, no effect was found to have been produced on its virulence." With regard to heat, however, Lamb, in 1903, in an article in the *Glasgow Medical Journal*, says that heat does affect venom when it is in solution, and in the following way :—

1. Some of the proteids become coagulated.
2. The toxic power of the proteids which are not coagulated is impaired.

Not only are snake venoms very stable substances, they are also very composite ones. They are almost pure solutions of proteids, with a trace of inorganic salts, and each venom may contain several different proteids, and different snakes have these proteids mixed in different proportions.

These various proteids represent several independent toxic principles, viz., neurotoxins, those acting especially on the nerves and nervous centres ; cytotoxins, those causing necrosis of the ordinary tissue cells ; hæmolysins, hæmaglutinins, hæmorrhagins, and thrombokinase, acting in the various ways denoted by their names on the blood and blood vessels ; and precipitin.

Weir-Mitchell and Reichert long ago recognized that there were at least two different active substances in venom, and they distinguished these as peptones and globulins. They found that the peptones cause rapid putrefactive changes locally, but no extravasation, while globulins cause hæmorrhages and destroy the natural ability of the blood to clot. They say that in proportion as the peptones predominate will we have less marked local lesions, while in proportion as the globulins predominate there will be œdema, extravasation of blood, and discoloration of the parts. They further found that solutions of the globulins had their toxic effects destroyed by heating to 75° C., while those of the peptones were much more resistant. These experiments gave a broad basis for the distinction between the symptoms of the cobra (*Naja tripudians*) and the rattlesnake (*Crotalus*). The

symptoms of cobra poison are mainly felt in the nervous system, due to the presence in that poison of a large proportion of the neurotoxic principle, which resists heat. An animal bitten by a cobra, after a short time becomes lethargic; the hind legs become paralyzed, and paralysis spreads forward to the fore legs; the animal lies down completely paralyzed. Finally respiratory paralysis occurs, there is a slight convulsive movement, and death. There is no failure of the heart or diminution in the strength of the pulse, and the heart may go on beating for twenty to thirty minutes after breathing has completely stopped. Cobra poison also has a destructive effect on the red blood corpuscles, and diminishes the coagulability of the blood plasma, but to an extent slight when compared with the poison of the daboia or Russell's viper, an Indian snake corresponding to the American crotalus in the character of its venom. The symptoms of poisoning by daboia are primarily on the blood. There is no paralysis of limbs, and the respiration seems affected only secondarily to blood and heart changes. On the other hand, these changes are marked; there may be syncope from depressed heart, and the arterial tension is always much lowered. If the stage of syncope is survived, hæmorrhages and œdemas occur, the blood loses its coagulability, the red corpuscles are destroyed, and there is destructive action on the capillary walls, allowing extensive extravasations of blood and blood-stained plasma, and not only at the site of bite, but in any part of the body, especially from mucous and serous surfaces. Bacterial infection is apt to set in in the œdematous and blood-stained parts and cause general septicæmia or malignant œdema.

The rattlesnake bite causes similar hæmorrhagic symptoms to the daboia, but even more pronounced. The daboia poison has, however, one mark of distinction from the crotalus, in the quantity of its agglutinating principle. When the poison is injected in considerable doses it causes death rapidly—in from ten to fifteen minutes—by producing a universal intravascular thrombosis, which causes death by asphyxia accompanied by convulsions.

It would seem that the clotting principle thrombokinase, when it is present in sufficient quantity, acts and

causes the thrombosis before the hæmolytic toxins have had power to destroy the corpuscles, but that with less doses of the poison this does not occur, and the blood is soon broken down by the hæmolysins into a fluid non-coagulable condition.

The poisons that act most powerfully on the blood have the greatest effect on the blood-pressure; thus crotalus and allied snake poisons, when injected subcutaneously, caused a progressive fall of blood-pressure, while with cobra poison there was a tendency to a rise of pressure after the initial fall which may go above the normal as death approaches, owing to the asphyxia, which is then the cause of death.

The respiration in snake poisoning is always depressed —in cobra poisoning by a direct action on the respiratory centres, in crotalus and daboia poisoning secondarily to the vascular and cardiac changes.

Further experiments regarding the toxic principles of snake venoms have been recently made by Dr. Hidayo Noguchi, assistant at the Rockefeller Institute of New York, and published in this year's March number of the *Journal of Experimental Science* issued by that Institution.

He finds that if the variation in resistance of the toxic principles of snake venom to moist heat is taken in order, the order will be as follows: Neurotoxin resists brief boiling; hæmolysin is destroyed at 135° C.; hæmaglutinin at 75°–80° C.; hæmorrhagin, cytolysin, and thrombokinase at 75° C.; and precipitin at 96°–100° C. He remarks that since the venoms of different species and orders of snakes vary according to the prevalence of one or the other class of toxic constituents, the ease with which they succumb to heating depends on the nature of the predominant principles. Hence, rattlesnake in which hæmorrhagin and possibly other locally-acting non-heat-resisting poisons are predominant, and daboia venom, in which much thrombokinase is contained, are easily diminished in activity by heating to 75° C., at which temperature cobra venom suffers little change in toxicity.

More interesting than these experiments on the influence of heat on venoms, which were largely anticipated years ago by Weir-Mitchell and Reichert, are those he made on the influence of fluorescent bodies. It has been found that

if unicellular organisms—bacterial and other toxins—are mixed or suspended in a solution of some substance which in solution exhibits the phenomenon called fluorescence, and if these solutions are then exposed to the influence of sunlight, the organisms are destroyed. Sunlight is essential to the action of the solution. Thus a solution of muriate of acridin (a fluorescent substance) of the strength of 1–20,000 has no effect on protozoa in the dark, but destroys them in sixty minutes in diffused sunlight, and in six minutes in direct sunlight. Again, sunlight which has already passed through a fluorescent solution is robbed of its power to set up fluorescence in a second solution. No intensification of toxic action is produced in the second solution by the filtered light. Fluorescent light itself is without toxic action on infusoria; to obtain a toxic effect the living organisms must be immersed in the fluorescent fluid.

All fluorescent substances would seem to be able to exert photodynamic action; but there is much variation in the intensity of action among the different fluorescent bodies themselves and a further variation according to the substances—living cells, ferments, toxins—upon which the action is exerted. The relation of degree of fluorescence and intensity of photodynamic action is a reverse one; as a rule, the weaker solutions of the fluorescent body are the more active.

Hidayo Noguchi made experiments to find out what would be the relative influence of fluorescent bodies on the different snake venoms.

The fluorescent dyes used were eosin and erythrosin, and the snake venoms those of cobra, daboia, and crotalus. The dyes were used in a 0·25 per cent solution, the daboia venom in 0·1 per cent, and the cobra and crotalus venom in 0·4 per cent. Four parts of venom solution were mixed with one part of dye solution, hence the dye was present in the solution in the proportion of 0·05 per cent. The mixtures were divided into two parts, and one part kept in the dark, and one in the light, for thirty hours.

The venoms mixed with dye kept in the dark were all unaffected. From those kept in the light the following results were obtained:—

The hæmolytic power of both crotalus and daboia

venom was reduced, that of cobra venom not appreciably.

The toxic power of both crotalus and daboia venom was reduced *pari passu* with that of its hæmolytic power, that of cobra venom scarcely at all.

In crotalus venom hæmorrhagin and hæmolysin predominate, and neurotoxin is in but small quantity; it is the former principles that are destroyed by the photodynamic action of eosin in sunlight, which acts quite rapidly, and the toxicity of the venom is quickly reduced.

Daboia venom is rich in hæmolytic and cytolytic principles, but its chief peculiarity of action results from the thrombokinase which it contains. The experiments show that the clotting principle — thrombokinase — is completely destroyed by the fluorescent dyes (eosin and erythrosin) in sunlight, and the general toxicity is considerably reduced.

Venom neurotoxins are highly resistant to photodynamic action; hence cobra venom, in which they largely predominate, remained almost unaltered and had its toxicity but little impaired. We thus see that the action of fluorescent bodies in sunlight differentiates between the different toxic bodies in snake venom very much in the same way as heat does.

Lichtwitz found that it is the complements (of Ehrlich's side-chain theory) but not the hæmolytic immune bodies or amboceptors of normal and immune serums that are destroyed by eosin in the light. This would be expected, for it is the complements and not the amboceptors that are destroyed by heating the sera above 75° C. While the amboceptors are indispensable the complements are the activating bodies.

You will notice that I have said nothing about the venom of lachesis, the great South American snake that Constantine Hering introduced to the profession, that furnished the first snake poison ever used in medicine for the cure of disease, and that has ever since retained the first place amongst the snake poisons in therapeutic practice. I have said nothing, because I have not been able to find any account of any experiments on the venom of this snake. Most of the experiments have been made on the colubrine and viper snakes of India, represented by the cobra and daboia, and on the North American family

of the crotalidæ, besides a few on the Australian snakes. The reason, doubtless, is that these have been the most readily procurable, and that the experiments have been carried on mainly in India, and in England and the United States, which have free communication with that country. But I think we are justified in concluding that lachesis venom must be almost, if not quite, as rich in neurotoxins as naja, and has a great many more of the hæmolytic and hæmorrhagic toxins than that venom, approaching crotalus in this respect. We may conclude this from the symptoms it presents both in its poisonings and its provings. It is more generally useful than either of the others, covering as it does the ground occupied by both, and it is, moreover, the poison which has been best proved in the homœopathic school, and the indications for which have been the best worked out. That this is so is another proof, if any were needed, that good provings on the human subject according to Hahnemann's rules are more valuable for therapeutic purposes than any number of physiological experiments. If I had anything new in regard to the therapeutics of snake poisons to bring before you, I should not now be dealing with the matter from the physiological and pathological standpoint, but would spend the time in a more practically profitable manner. But the therapeutic ground, so far at any rate as lachesis and crotalus are concerned, has been worked so efficiently by Hering and Hayward that there seems little left to discover. In the meantime it is interesting to watch pathology slowly advancing towards the position long occupied by therapeutics, confident as we may be that each advance will only the more surely establish our therapeutic law of *Similia similibus*.

One of these advances has lately been made with regard to the action of the neurotoxins of snake venom. The symptoms of provings and poisonings have always made it certain that the venom had a profound influence on the nervous system, especially of that of the central nervous system, and above all of the medulla and upper cord. But there was no gross pathology to show this; no microscopical changes had been shown in the nerve centres, and there were those who maintained that all the nervous symptoms were but secondary to changes in the blood,

and not due to any direct action of the poison on the nerves. No one who had carefully studied the provings of lachesis with high dilutions could fail to believe that the nerve cells were directly affected, but pathological proof was wanting. But an article appeared in the *Lancet*, on January 2, 1904, in which Dr. George Lamb, of the Indian Medical Service, and Dr. Walter K. Hunter, Lecturer on Materia Medica at the University of Glasgow, published an account of some experiments made on animals with cobra poison. The object of the experiments was to show what influence of a direct nature the snake poisons have on the nervous system, and to decide whether the cause of death in poisonous cases is due to the action of the venom on the blood as maintained by Cunningham, or whether it results from a primary action of the poison on the central nervous system.

As hitherto no pathological changes had been found to be present in the nervous system, they decided to endeavour to ascertain whether such changes would not be evident in a fresh series of experiments, if a more modern and perfect method of histological examination were adopted. Six monkeys and three rats were used for the experiments, and were killed by subcutaneous injections of cobra venom in doses ranging from 0·5 mgm. to 10 mgms. per kilogram of body weight of the monkeys, and from 0·05 to 0·25 mgm. per kilogram of body weight of the rats. Microscopical sections were made of various parts of the brain, medulla, and cord.

The result was to show that in those of the monkeys in which death did not take place till after two hours (the time required for changes to take place) distinct evidence of degeneration of nerve cells was found in cord, medulla, cerebellum, and cortex. The same degenerative changes were found in all the rats. The degeneration was found to affect the cells of the anterior horns in both the cervical and lumbar enlargements of the cord; in the pons and medulla, the 12th, motor 10th, and 7th nuclei all contained a considerable proportion of abnormal cells; the pyramidal cells of the cortex showed commencing degeneration; and in the cerebellum not one normal Purkinje cell could be found. The Nissl chromatic bodies of ganglion cells were destroyed. The cells of the posterior

horns in the cord were affected to a less extent; and lastly, nerve fibres in the cord as well as in the peripheral nerves were found to some extent degenerated. The vessels to these parts were considerably dilated, and in the cord some small hæmorrhages into the grey matter were seen. "Thus," they conclude, "we see that in cobra poisoning we have a toxic substance which, when injected subcutaneously, produces symptoms of muscle paralysis, and that when we examine the nervous mechanism which controls these peripheral muscles there is found to be evidence of such degenerative changes as are known to be so frequently associated with paralysis. It seems fairly certain, therefore, that cobra venom has a direct action on the motor neurons. . . . We cannot but conclude that it has a specifically selective action on the nervous system, and that it is from this that death results." So we see that symptoms derived from the provings of the snake poisons, and of the high dilutions of those poisons, are shown by the latest and most modern microscopical methods to have a pathological basis.

It has long been remarked that though snake poison has such a powerful toxic effect when injected under the skin, it has but a very feeble and uncertain effect when taken by the mouth. This is not because of any action produced on it by the gastric juice, for it has been shown that the gastric juice has no power to diminish the toxicity of venom. The stomach walls must, therefore, be incapable of absorbing it. If, however, some venom be injected into an isolated loop of the small intestine, it is readily absorbed and produces the usual poisonous symptoms. Something, then, must happen to render the venom innocuous in its passage from the stomach to the small intestine. It has been found that the bile has some share in rendering the venom harmless, but that the chief agent in so doing is the trypsin of the pancreatic juice. It is probable, however, that a certain small quantity of the venom gets into the system unchanged, for an animal which has been fed with the poison succumbs more readily and for smaller doses to subcutaneous injections of snake poison than one that has not been so fed.

If, however, the feeding with the venom occurs at sufficient intervals and is not in too great amount, the

effect is in the direction of immunization. Similarly, if sublethal doses of venom are administered subcutaneously, and if sufficient time is allowed to elapse between the injections, the animal acquires a protection against the influence of the venom; but if the doses are given at too short intervals death will result from what otherwise would have been a sublethal dose. This is parallel to Professor Wright's discoveries with regard to the opsonic index of the blood in injections of tuberculin, injections at too frequent intervals diminishing the opsonic power, while if the intervals are sufficiently prolonged the opsonic value is increased.

Here again modern discoveries confirm the observations of homœopaths made long ago, that too frequent repetition of the dose might destroy the power for good of the similarly acting remedy.

Snake-charmers sometimes acquire immunity to the effects of bites by their practice of rubbing the venom into the palms of their hands; enough is absorbed through the skin to induce immunity. It is probable also that the mongoose owes its large share of immunity against snake venom to its habit of devouring the head of its victims as soon as the victory has been won. As a proof of this it was found that the descendants of a species of mongoose that had been imported to Mauritius, where there are no snakes, had, after some generations, almost entirely lost their immunity.

Though it is possible, by gradual and repeated inoculations extending over some time, to render a person more or less immune to snake venom, it is of more practical importance to discover some antidote which will be efficacious at the time when a person has been bitten. It was hoped that some advance in this direction would result from the discovery that precipitins could be formed in the serum of animals which would precipitate venom. Lamb found in 1902 that the serum of rabbits which had undergone a process of immunization to cobra venom was a powerful precipitant of the poison, and not only of the cobra venom, but also that of the *Daboia Russellii*. In a further paper Lamb related that he had prepared an anti-serum for the serum of the cobra, which precipitated not only cobra serum, but also cobra venom. It was hoped,

therefore, that these sera, when injected, might act as antitoxins in the same way that the antidiphtheritic sera do. But it was found by Hunter, from experiments made as Carnegie Research Fellow in the Physiological Laboratory of Edinburgh University, that there is no connection at all between antitoxic and precipitating power on the one side, or toxicity and precipitability on the other, in the case of snake venom. He concludes: "The proteids of snake venom form a complex mixture; some of its constituents are coagulable by heat, some are not; and while it is certain that all coagulable proteids can form precipitins, it is not yet proved that any incoagulable ones can do so. The balance of probability appears to be in favour of the view that venom precipitins must be largely, if not entirely, antibodies related merely to the coagulable portion of the venom, a portion which forms a very small percentage of the toxic contents; on the other hand, the greater part of the antitoxin will find its affinity amongst the incoagulables. Consequently the precipitin producing substances are not the toxins, or only a small part of the toxins, and the precipitins produced by them and the sera containing those precipitins have no antitoxic properties. So they are not available as remedies in cases of snake bite."

The nearest approach to the production of a successful antidote has been made by Dr. A. Calmette. He found that immunity against a dose of venom usually lethal to fresh animals can be obtained in the following manner. If we inoculate under the skin of a rabbit 2 mgms. of cobra poison, a dose capable of killing the rabbit in less than two hours, and if twenty minutes afterwards we inject chloride of lime diluted to $\frac{1}{60}$ around the poison wound, and also in various other parts of the body, the rabbit thus treated resists the attack of the poison after a transient illness. The animal is ill and falls away at once, and continues to do so during the following six or eight days, but after that its health is completely re-established. If then, after a fortnight's rest $\frac{1}{8}$ mgm. of the venom is injected, it does not succumb. The previous injections of venom and chloride of lime have vaccinated this rabbit against the dose of $\frac{1}{2}$ mgm., which kills within eight to twelve hours all the other unvaccinated rabbits used as a control.

But it was further found that chloride of lime, without any admixture with venom and without venom being separately injected, if introduced by inoculation in small quantities for four or five consecutive days under the skin of rabbits produces the refractory state. The animals thus treated can after six days resist a mortal dose. And also the serum of animals which have received immunity by either of the preceding methods possesses similar properties to those which Behring, Kitazato, Rose, and Waillard have established for the serum of animals against the poisons of tetanus and diphtheria, i.e., an antitoxic serum to snake poison is produced. Calmette's anti-venomous serum is obtained by immunizing horses by the foregoing methods, and using their serum. From 20 to 40 cc. of serum should be injected as soon as possible after the patient has been bitten. The claims that Calmette makes for this serum have been substantiated in practice in the case of cobra bites, but it has not been found so successful for poisoning by other snakes. Calmette also recommends the direct injection of a chloride of lime solution, either supplementary to his serum or when it is not obtainable. He prescribes a dose of 20 to 30 cc. of a 1 in 120 solution of chloride of lime in water for a man poisoned by a snake bite.

The interesting fact about these experiments of Calmette for us as homœopaths is that injections of an inorganic substance like chloride of lime can produce an immune serum. That gradual and repeated injections of an animal poison will cause the production of antibodies in the serum of the animal injected, seems to be a well-established law for all kinds of proteid substances; that the injection of inorganic salts should also cause their production in certain instances is of great significance, showing as it does that simple chemical salts can produce results in the body similar to those produced by the most complex protoplasmic substances. If chloride of lime can cause the body cells to form antibodies to snake poison, other drugs can doubtless cause them to form antibodies to other poisons: cyanide of mercury, for instance, may cause the formation of substances antidotal to the diphtheria poison; and we have in this way an explanation of drug action in disease, an explanation which, I believe, was first definitely

formulated by Dr. Johnston in his paper to the Congress two years ago at Oxford.

The net result of all these recent researches into the constitution and action of snake venoms has been to establish more firmly on the pathological side the homœopathic relationship of these substances to the diseased conditions in which they have been found curative by our school. We have long known that crotalus was our best remedy for septic wounds and for hæmorrhages accompanied by disorganization of the blood and destruction of the blood corpuscles. We have recently learnt that of all the snake poisons it is the most opulent in cytotoxins and hæmolysins which rapidly produce the septic or gangrenous condition of the tissues and the degraded hæmorrhages which resemble the septic wounds, and foul ulcerations, the putrid blood-mixed discharges, and the pourings forth of broken-down blood from any or all of the mucous surfaces, which, whatever the name of the disease in which these symptoms occur, are always successfully met by the administration of crotalus.

In these conditions we have not been accustomed to prescribe naja, because the provings we possessed of naja, and the cases of poisonings by bites of that serpent, exhibited those symptoms of sepsis and hæmorrhage in a much less marked degree than either crotalus or lachesis. We now know that this is accounted for by the cytotoxins and hæmolysins being present in but slight degree in the naja poison. But we know, on the other hand, that the neurotoxins are in great abundance, and that our selection of naja amongst the snake poisons to combat affections of the nervous system, especially those involving the centres of respiration, the cardiac and vasomotor centres, and the nervous supply of the throat and neck, is justified by their close homœopathic relationship.

I will quote a case recorded by Dr. F. E. Williams, of Haddonfield, New Jersey, in the *Hahnemannian Monthly* for April, 1902, which will afford a good illustration of an affection of these centres cured by naja. Dr. Williams writes: "In December, 1890, the patient passed through a severe attack of la grippe, followed by bronchitis, and two weeks afterwards by pneumonia, from which she made a good recovery. The patient was a lady of nervo-

sanguineous temperament, delicate all her life, 39 years of age, and the mother of six children. Two months after the attack of pneumonia, on March 29th, I was hurriedly summoned to see her, and was informed by the husband she had been taken a week previous with attacks of suffocation, coming on suddenly, lasting a second or two, and passing off as suddenly as they appeared. She had been having five or six of these attacks in the twenty-four hours, occurring frequently at night while lying quietly in bed. Between these spells she had attended to her domestic affairs as usual, and the family were not much alarmed until the day previous to my visit, when she had twelve attacks of a more severe nature, lasting much longer, and followed by great prostration and irritability, sleepy and stupid, with a desire to be alone. In three days another paroxysm occurred, and thereafter on an average every two or three days. By the middle of April, the paroxysms were growing less severe and at longer intervals, when the disease took a sudden turn, and the attacks followed one another more closely than ever before, leaving her so prostrated that by the last day of this month she was confined to her bed and unable to raise herself without assistance; so great was the prostration that the prognosis became unfavourable. A few days after I succeeded in finding the patient in one of the paroxysms, having previously been obliged to depend for guiding symptoms entirely upon the observation of the attendant, and the memory of the patient, which was much impaired. The paroxysm consisted of the following symptoms: Suddenly, without warning, respiration ceased; as she expressed it, 'everything seemed to stop;' she would clutch her hands or grasp any near object; head thrown slightly back, muscles of neck rigid, eyes wide open and pupils dilated; mouth half open and rigid; muscles of back rigid, occasionally opisthotonos but not always; limbs stiff, though movable, and cold; deglutition impossible, and complete aphonia. Percussion of the chest produced a clear resonant sound, and auscultation revealed no respiratory murmur; the chest was well filled with air. The heart sounds and impulse were normal, though slower than usual. Pulse full, regular, and slow, averaging 65 to the minute. She did not lose consciousness, but could

not speak or motion to her attendants. These paroxysms would last from two to eight or ten minutes, and suddenly be relieved by a violent and successful effort to restore respiration, when she would sink back utterly exhausted, with increased pulse, sometimes palpitation for a short time, slight headache, and fullness in the head. Between these attacks she was exceedingly weak, suffering with pains in the limbs, and difficulty in moving them; the appetite was fairly good, bowels regular, and the menstrual period normal and regular during her entire illness. Any nervous shock, excitement, or worry would aggravate her troubles. The remedies principally relied on before I saw her in a paroxysm were bell., zinc. met., hyos., sepia, and agaricus. With these I was enabled only to relieve the severity of the attacks and to lengthen the time between them. After making a careful examination while she was in a paroxysm I decided that naja was the remedy, and gave the 3x in water, a teaspoonful every three hours. Improvement began immediately, and continued until she was entirely free from the paroxysms."

No doubt everyone here could quote many similar cases which would illustrate the curative value of the neurotoxins of naja and of lachesis.

But, after all, the isolation of these different toxins in the physiological laboratory, though it may satisfy our craving for a pathological basis for our prescribing, and assist in a scientific demonstration of the law of similars, gives us but little assistance in the practical work of prescribing. We learn from this modern laboratory work no indications for differentiating the various uses of these venoms which we did not know before from the provings. In fact it does not carry us so far as the provings; it gives us the gross indications for the venoms, but does not follow them to their finer shades of action. It has no information to give us, for instance, concerning the mental effects of the poisons. It cannot differentiate between the low muttering delirium, talking to himself, with drowsiness, of crotalus, the rapid excited talking of lachesis, and the suicidal insanity of naja. We should never have learnt from it such a valuable guiding symptom common to all the snake poisons as "symptoms worse on waking from sleep," "sleeps into an aggravation." We should never

know from it that crotalus, bothrops, and elaps affect mainly the right side, and lachesis and naja the left; that with naja there is aphasia from paresis of the organs of speech, with bothrops aphasia from loss of memory, and with elaps the patient can speak, but cannot understand speech. For all these and a hundred other important symptoms—important for the treatment of disease—we have to go to the provings.

The truth is that the method adopted by Hahnemann for the elucidation of drug action—the proving of drugs in the healthy human body—is the most really scientific. The work is done with a finer instrument than those used in the laboratory. The human body is a more delicate reagent than any chemical test, and the conscious human mind gathers information which no microscope can reveal.

It is right that we should reject no knowledge from any quarter, and should keep ourselves informed of all the latest discoveries made in physiological chemistry and in other departments of modern science, but we must not forget that we, the homœopathic body, inherit the best method ever employed for the discovery of the therapeutic value of drugs, and that in the division of labour, which must occur in medicine as in all other pursuits, our peculiar province should be to perfect and extend our provings. We may be assured that if we do so we shall always be in the van of progress in the knowledge of the therapeutic use of medicines, and that any future discoveries made in the laboratory will but supplement and confirm truths which we shall already possess.

Discussion.

The President: I am sure you have listened with interest to Dr. Stonham's learned and encouraging paper. I shall now ask you to discuss it, and will reserve any remarks I may have to make until the close of the discussion.

Dr. Dyce Brown said he wished to thank Dr. Stonham for his interesting and valuable paper. The subject dealt with was one of the most interesting that homœopaths could take up or tackle. Formerly, as they all knew, the use of serpent poisons was laughed at by the old school. Now they were beginning to see that they had some action. It seemed to him that the physiological experiments on the

human body and on the lower animals were interesting, but they did not go far enough; they left the profession where it was as to the value of the serpent poisons, and the indications as to their use as remedies. It was very important that papers of that character should be brought before the Congress, to show really what the old school had done, and, still more, what they have not done. The experiments have been important in their way, and it was really interesting to know that those on the lower animals corroborated generally what we know of the action of the serpent poisons on the human body. At the same time it was of the greatest importance to have provings on the healthy human body, independently of any theoretical views, which might be only misleading.

Dr. Murray Moore said there was one thing which had always puzzled him, and that was that alcohol was an antidote to the poison, therefore, he would ask Dr. Stonham to inform him whether there was any way of preparing these poisons for medicinal purposes, and avoiding the use of alcohol. He had made a cure with lachesis 6 and with mal. 3, and it had always been a puzzle to him to know how it was these medicines could act when they were diluted with alcohol. Was there not some way of preparing them with glycerin or distilled water to make them more efficacious?

Going into the question of analysis, he would ask whether that was any use to them. It was of scientific interest, but it was very difficult to distinguish between the toxin of venom and the antitoxin. Those who have given very close investigation to the subject think they got better results, or were likely to do, by injecting the homœopathic dose of the certain poison appropriate to the case. Would it act better and quicker, and should they have to administer fewer doses in injecting it rather than by giving it through the mouth? Dr. Stonham had raised some doubt in his paper upon the action of these poisons as homœopathic remedies given through the mouth. He thanked Dr. Stonham for the large amount of instruction in the paper—it was one of the most important scientific contributions to homœopathy on that subject that they had ever had.

Dr. Hayle said the paper was most interesting in every respect, and was a clear scientific exposition of the action and the cause of action of the serpent poisons. It also showed clearly that some of these serpent poisons were much more active than others. But this was so in every class of medicines, and seemed to him that it was a strong proof of evolution beginning with a low form of serpent till ultimately

they came to the most active, viz., the lachesis. Of course, each poison showed some variety in its action in the human being; but lachesis seemed by far the most active in every way. He (Dr. Hayle) would confine himself in treatment to that serpent when he wanted to get the serpent poison action on the patient. He very much doubted the provings when one serpent poison gave symptoms on the right side of the body and another on the left side, as Dr. Stonham said lachesis and elaps did. He thought when this was the case it was the difference in these persons that gave rise to the symptoms being on one side or the other, and not to the difference in the nature of the snake poisons. On studying disease carefully and minutely, one must come to the conclusion that individuals vary immensely in their constitutions, and if the provings are not very extensive we might easily get such results as those Dr. Stonham had mentioned in relation to the right and left side, but the variation would be due to the person and not to the poison. That was all he wanted to say.

Dr. J. Hervey Bodman said he should like to ask another question with reference to the use by Calmette of injections of solution of chloride of lime following the injection of a serpent poison. He understood Dr. Stonham to say that he believed the efficacy of this to be due to the chloride of lime causing the formation of antitoxic substances in the blood. He wished to ask Dr. Stonham what were his reasons for holding this opinion. In the paper no evidence was produced in support of this view, and it seemed quite possible there might be some other explanation of the antidotal effect of the chloride of lime, such as a direct chemical action on the poison. As to the relative value of homœopathic provings and laboratory methods, they must, as Dr. Stonham had pointed out, rely for their own information upon the ordinary homœopathic proving, as being the more useful in actual practice; but they must not shut their eyes to the results obtained by experienced workers in the laboratory as to exact physiological, chemical, and other reaction. By these means they would probably find grounds on which to commend the principle of homœopathy to the regular school. They had not only to consider those evidences of drug action which they could best utilize in practice, but they must be on the lookout for evidence and information that would enable them to prove the truth of homœopathy to the dominant school; and most likely in their researches and laboratory experiments they would find the grounds on which that would be possible.

Dr. E. B. Roche said with regard to the matter which had just been mooted, that of injecting two substances together, they would remember, as in the case of cocaine and renalglandin, when combined, the local action had been valuable in keeping the cocaine in the neighbourhood of injection, and thus locally increasing its anæsthetic power. They knew that calcium salts had a coagulating effect on the blood. It might be that these injections caused coagulation. The blood was localized and kept from general circulation, the venom enveloped, and possibly destroyed, where it had been injected. Personally, he was very much obliged to Dr. Stonham for the paper, and he hardly agreed with the criticisms with regard to the various snake poisons. He considered a good case had been made out for the selection of the various remedies, although not going into the question of left and right, which must be left to discretion, and estimate of the value put upon the symptoms.

Dr. Ord said he had been struck with the admirable way in which the paper from Dr. Stonham had followed the President's Address. If it had been by pre-arrangement they could not possibly have done it in a more striking manner. He would also like especially to refer to the remarkable corroboration of the old homœopathic principles brought forward by modern researches in the laboratory. The President had given them some valuable illustrations of this, and now Dr. Stonham had brought forward the serpent poisons, which they had used for sixty or seventy years, and he had pointed out that modern researches upon the chemical constituents of these poisons had confirmed those effects for which they had used them under the law of similars. Reference had been made to the fact that in the laboratory experiments direct sunlight increased the effect of these poisons. They could make use of that fact, not only in the effect on poisons, but in medicinal treatment. The action of light was of great importance in relation to the actions of various drugs. They had frequent difficulty in getting reaction to drugs in cases of patients who lived in the slums of cities, from whose lives sunlight was almost excluded. He thought the power of the sun, and exposure to the sun's rays, in any disease, chronic or acute, was a power which might help not only treatment by serpent poisons, but other drug actions in the human system. One other fact of importance was the accuracy and certainty with which most of these poisons would act in disease. Some drugs one did not feel so confident about prescribing, but he knew none in which they could have more confidence than in lachesis, and similarly with

the other serpent poisons, though not, perhaps, to the same extent. He had never prescribed lachesis in carefully considered symptoms without getting definite results, and that in high dilutions up to 200, as well as in ordinary dilutions. This seemed the more remarkable because it was a drug about which some little mystery existed, as to whether the lachesis now used was from the same serpent from which the symptoms taken by the provers were arrived at. Dr. Hering sent a supply round to a number of chemists at the time, and the chemist who supplies his (Dr. Ord's) drugs had some of that original supply by him, which was quite reliable in its effects. He would just like to say to Dr. Hayle that he had the pleasure of cordially disagreeing with him in regard to left- and right-side action, and especially with regard to snake poisons. He would always believe in this with regard to some drugs, from the anatomical reason that his liver was on one side and his heart on the other. He had also two lungs one on the right side and one on the left. And in spite of the surgeons, he had, he was thankful to say, been able to retain his vermiform appendix on the right side. It was a fact that in practice drugs acted some on one side and some on the other. It was a perfectly rational result of therapeutic action, and there was nothing superstitious about it.

Dr. W. Wolston said he joined with those who preceded him in thanking Dr. Stonham for his instructive paper. Much that had been brought forward was new to many of them, but he thought as to the actual use of the serpent poisons in practice they knew as much before the experiments were made as they did now. They came in very helpfully as buttresses to the truth which homœopaths had believed in, and acted on, for more than forty years, although they did not need such buttresses. The truth was, they knew what homœopathy was, and they had learned too how to use the serpent poisons on homœopathic lines. As to holding the various poisons as being identical, and using them indiscriminately, he would take exception to that, and most of his fellow practitioners would also say the same, he was sure. Each serpent poison certainly had a different range of action, and, in his experience—which was, perhaps, as long as that of any one present—forty years—he had found there was much difference in the use of these potent remedies. Broadly speaking, lachesis was the one that he had used most widely. It was effectual in numerous diseases of women. Given a case where the symptoms were such as indicated a serpent poison as a remedy he would expect to find the remedy in

lachesis most generally. On the other hand, he had observed that in patients, either male or female, where there was pericardial distress and symptoms referable to the heart, naja would most likely prove to be a valuable remedy. Again, if called to treat a broken-down patient of either sex, with open wounds, or a septic condition, indicating general blood-poisoning, in crotalus they had a remedy superior to either lachesis or naja.

Dr. Madden said he should like to offer his thanks for the paper, and to point out to Dr. Ord that the Council of this Congress did try to make the papers run more or less in the form of a symposium, so that there should be an underlying current of similarity in the papers, and the President had tried to make his address run on the same lines. Though there was no collaboration it had been co-ordination, and altogether it was remarkably successful. He thought they would find that the afternoon paper would carry them forward on the same line of thought. It was interesting to see how, in the provings of serpent poisons, which had been made by taking the drugs in various dilutions in the stomach, they had got symptoms which brought them to the same conclusions as pathological experiments done by injection. Either the homœopathic dilution made it possible to produce symptoms which they did not in crude form, or there was something left out in their conclusions somewhere. They had aseptic results from the dilutions taken by the mouth therapeutically. With regard to the use of tuberculin, staphylococci, and so forth, he was sure in time they would find they could make use of them satisfactorily without injection. It would not be necessary to use tuberculin in crude form as is now the case. He did not quite know how far it would lead them, but he felt quite certain that as Dr. Burnett had obtained equal results from bacillinum, if not better, than Dr. Wright had from tuberculin, they would in all these animal products. He thought they might say broadly that the crude injection and serpent bites gave them merely the pathological basis of the disease for which these medicines were useful, but homœopathic provings were necessary to give the details to enable them to treat the case symptomatically, and for such requirements as to show whether a drug was more suitable for the left or the right side of the body, etc.

Dr. C. B. Kinyon (of Michigan, U.S.A.) said it afforded him great pleasure to rise and accord the Congress his thanks for the warm reception he had had during the time he had been in that city. Some things he had heard and noticed

had taken him by surprise, and one was that they were manifesting more attention to close scientific thinking on this side than they were in America. He would say that the President's address that morning was an admirable one. On his side of the Atlantic they were handicapped by a class of practitioner—he had known many of them intimately for twenty years, and valued their work very highly —who had no use for the modern scientific method, and confined themselves to the extreme high dilutions, and prescribed according to symptoms only. While that might be all right, so far as it went, the old school had the chance of ridiculing their work. They had that to overcome in America. Proceeding, Dr. Kinyon said he would say a word or two as to the work in the school with which he was connected, which he thought was the only school doing work along those lines. A man was appointed a year ago who had charge of what they called the laboratory of drug pathogenesy —he knew of nothing else like it in the world. It had been working on the lines of drug proving; utilizing all the modern methods of laboratory research, and they expected to be able to give reports to the Medical Institutes and journals in due time. With regard to Dr. C. Hering, no one thought more highly of him than did he. He was simply a prodigious worker, indefatigable and accurate. That reminded him of an interesting fact. Very recently he had met a person who was the widow of a Dr. De Guise, who went with Dr. Hering at one time to South America. Dr. Hering went back to Philadelphia, but Dr. De Guise remained in South America to continue the work. Dr. De Guise died there while he was making investigations with regard to a certain poison. His widow, who is now an old lady, has several letters written to her by her husband from South America when he was making these investigations, and as he is no French scholar he is making arrangements to have these letters translated, so that they could receive additional knowledge along the line of the serpent poisons. (Applause.) Many other things occurred to him, but he wished to be a listener rather than a talker.

Dr. Lambert remarked that with regard to what Dr. Ord said about the lachesis in use there had been a fresh supply recently. He quite agreed with those who spoke of the necessity of differentiating between the various serpent poisons. It would be as reasonable to say that, in cases where potassium was called for, they should use one particular salt in each case, and not distinguish between the various potassium salts.

The President said it was interesting to note the effect the sunlight had on bacterial toxins in connection with fluorescent substances. It had been proved in practice that sunlight was a rapid destroyer of protective bodies in the blood. As regarded calcium chloride, Dr. Stonham's view was the proper one. They had, for instance, ricin, alluded to by Dr. Johnstone at a previous Congress, which produced immunizing effects in the blood. Some poisons acted as remedies which did not act by producing antitoxins. Though strychnine was a good remedy for tetanus, it did not produce an antitoxin. Dr. Murray Moore had asked about the difference in the rapidity of action between the injection and administration by the mouth. He had had one or two opportunities of testing serpent poisons in that way, and he thought they acted more rapidly and more efficaciously when injected under the skin. All the speakers had touched on interesting points—he did not wish to displace the author by answering them, and would simply repeat what he had said at the beginning, how extremely interesting a paper it had been, and he was glad to see that his view had been endorsed by the speakers, and that there had been so interesting a discussion.

Dr. Stonham said he must thank them for the kind manner in which they had received his paper. As Dr. Madden mentioned, there was no collaboration in the matter of papers. He was to write a paper to fit in with the general scheme of the Congress, and he was pleased he had managed to follow the lines of the President's address, so that his paper was in some degree supplementary to it. Of course, one could write a much more interesting paper on snake poisons if one took the therapeutical side, and went into the various changes in the action of drugs, and quoted cases, but it would be impossible in the limits of one paper to take both sides, so he took modern research from the scientific side. With regard to the differentiation of snake poisons, Dr. Hayles' objections had been abundantly answered. One must, he thought, acknowledge that these poisons had very distinct characteristics of their own. They might find a case where lachesis would not do, and another snake poison should be used. With regard to the question of the left or right side of the body, he thought that had been pretty well worked out. There was a recent confirmation in the report of the O. O. & L. Homœopathic Proving Society; they had issued their provings of belladonna, and they say that it acts more on the right side of the head than on the left in connection with a large number of provings. The same

might be said of any other medicines. With regard to the injection of chloride of lime, there was a little confusion on this ground, but he thought it must be accounted for by the fact that it has a double action. The lime injections, when small and repeated, are capable of producing an antitoxin serum. But they did seem to have some direct action as well as an action in connection with creating an immunizing body. It might be due to the coagulating power of the blood, which would immesh the toxins. With regard to taking snake poisons by the mouth, it seemed there was a certain small quantity got into the system taken from the stomach. If an animal were fed with snake poisons in fairly large amounts it was rendered less capable of resisting a snake bite—sufficient was absorbed into the system to keep it in such a condition as to render the animal more susceptible to the poison; but if fed in small quantities, enough was absorbed to render the system immune. He thought it must have a limited absorption. With regard to the mode of administration—they acted perfectly through the mouth. Dr. Neatby thought he had got a quicker action by injection, but for most diseases the mouth was sufficient.

FRANK A. WATKINS, M.R.C.S., L.R.C.P., L.S.A

VACCINE TREATMENT OF INFECTIVE DISEASE.

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IMMUNITY is the condition which is sought to be attained by this method of treatment. Whilst the subject of immunity is a most complex one at the present time, and no satisfactory theory has been formulated to fit in with all the established facts, yet a very great deal has been effected in unravelling the mysteries in which it has been enshrouded for so long. The theories advanced by Ehrlich are now generally accepted with slight modification.

For an intelligent appreciation of this therapeutic treatment of disease it will be necessary to refresh our memories with some of the more or less established facts in connection with immunity.

By the term immunity is understood a non-susceptibility to a given disease, to a given organism, or to a given toxin, which may be of bacterial or vegetable origin. The immunity may be natural or acquired. Natural immunity may be exemplified in the lower animals by their insusceptibility to the bacteria of leprosy and gonorrhœa. Acquired immunity may be arrived at by the animal passing through an attack of bacterial disease such as variola, measles, varicella, etc., or it may be produced by the artificial means of inoculation such as follows vaccination against small-pox or the injection of diphtheria toxin against diphtheria. Such a thing as absolute immunity is unknown; it is only present in varying degree, and it may last for a lifetime or be only transient. That many infectious diseases terminate in recovery is demonstration that a bacterial infection may be overwhelmed; the

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various microbes occupy various periods of time in this process of destruction. How nature effects this result we are much in doubt, but it has been established that certain substances appear in the blood during the progress of certain diseases which are antagonistic to the invading organism or its toxin, or both. In these cases the machinery of immunization proceeds during the course of the disease until it reaches a certain point, when the disease comes to a natural termination.

Artificial immunity may be attained in an active or passive manner. The former may be produced by the inoculation of the organisms in suitable doses and degree of virulence, or by their toxins. These injections are administered in increasing doses at suitable intervals until a certain degree of resistance has been obtained; in the process of time a very high degree of immunity may be reached, and endure for a considerable time. It is evident that this method of acquiring immunity is not generally available for the acute infections, for it is, comparatively speaking, only slowly evolved, and, moreover, the blood is already receiving the maximal amount of toxin or bacteria with which it can cope.

Passive immunity is brought about by producing a high degree of active immunity in one animal and then injecting its serum into a second animal. The serum, to be effectual, must be injected at the same time as the infection occurs, or soon afterwards, or otherwise the toxins will have already produced their poisonous results. This serum may also be used as a prophylactic, i.e., it may be used to protect an animal against a subsequent infection; but the immunity thus conferred lasts only a short time. In those cases of infective disease such as diphtheria or tetanus, where the serum effects immunity by neutralizing the poisons of the bacteria, it is termed antitoxic, but when its power is exerted against the bacteria themselves it is called antimicrobic or antibacterial: the latter may be exemplified by that which is used in the treatment of typhoid fever, cholera, pneumonia, etc.

The toxins are termed intra- or extracellular, according to whether they are contained within the bodies of the bacteria or whether they are external to them in the surrounding media. Both, chemically, are probably

proteids of the nature of albumose ; and in some respects simulate ferments. They are rendered inactive by heating to a temperature somewhere between 55° and 65° C., or by being exposed to the influence of ferments or the electric current.

The antitropins are substances which either neutralize the toxins or are capable of a destructive effect upon the associated bacteria. They are created within the body of the host, and, whilst it is not known with any degree of certainty in what part of the body they originate, they can be demonstrated to be present in the blood, and they normally subserve some function in the cell economy. They are inherited by the offspring in varying degree, or at least the capacity to produce them is inherited. It is thought that they are produced by certain living cells owing to stimulation by the corresponding toxins. Whilst it is supposed that the toxins are of the nature of an albumose the antitropins have a larger molecule and may be allied to the globulins. Generally speaking, they are not so readily destroyed by heat as the corresponding toxin. They are continually escaping from the animal economy by means of the various secretions, or burned up during the process of metabolism. They are frequently found in the lacteal secretion and in the yolk of eggs of immune animals.

Metchnikoff has done much pioneer work in elucidating the processes involved in the acquirement of immunity. He came to the conclusion that the successful resistance of an animal against bacteria depended upon the activity of certain cells which he called phagocytes, and divided into two classes ; (*a*) The microphages, which are the polymorphonuclears of the blood ; and (*b*) The macrophages, which include the large lymphocytes, endothelial cells, and connective tissue corpuscles. When an infection takes place these cells are guided in their attack upon the bacteria by a process termed chemiotaxis, and the cells have the ability to digest both dead and living organisms.

The insufficiency of this theory was apparent when it was found that immunity could be produced by the injection of toxins only, and further when the facts were discovered with regard to the action of antimicrobic sera it showed

conclusively that the intracellular ingestion of organisms was not the most important factor, but that it was the result rather than the cause.

At the present time Metchnikoff has much modified his theory and brought it into line with the facts established by others. It is now generally accepted that the antitropins in the serum of immunized animals are formed by stimulation of certain body cells by means of the bacterial products, and that the ingestion by the phagocytes is the terminal point of the process.

Yet some authors question whether the toxins are the substances which produce the antitropins by the stimulation of the body cells, and have advanced the following facts in support of their contention. It is possible to confer immunity by infecting animals with microbes whose toxicity has been much reduced or even rendered entirely impotent; again, immunity has been brought about by the inoculation of germs which are saprophytic, i.e., they never possessed any toxic properties.

Since it has been possible to separate the specific toxins from the other metabolic products of some organisms, it has been discovered that the immunity against the bacteria can be effected by the injection of these metabolic products only; and, further, that no immunity follows the incorporation of their specific poisons. Hence these observers believe that immunity is not the response to the corresponding toxins, but rather to their metabolic products. It would appear, as we shall see presently, that it is owing to these metabolic products that Koch's new tuberculin confers immunity.

These metabolic products are integral elements of the living protoplasm of the bacterial cell, and are supposed to possess a higher phosphorus content than the toxin; they pass with greater difficulty through a porcelain filter than the corresponding toxin, and are unchanged by a temperature of 70° C.

The various antitropins are distinguished from one another by their effects upon bacteria and their toxins; the most important are the antitoxins, the opsonins, the agglutinins, the lysins, and the precipitins.

The mode of production of the antitoxins.—Ehrlich supposes that in animals which are capable of supplying

antitoxin there are certain cells which contain molecules which, whilst performing a physiological function in the organism, have the capacity, when need arises, of uniting with the toxin molecule, and then its function in the cell economy ceases; but they are soon replaced by a process of regeneration; these may be again used up by the introduction of fresh toxins. Ultimately there occurs an over-supply of these secreted molecules of antitoxin, which is marked by their appearance in the blood.

This view is supported by the fact that an animal can be made to yield a much greater amount of antitoxin than the quantity of toxin used in the process; and, again, although after an immunized animal has been bled it is found that the antitoxin value of its serum may be low at first, yet it becomes partially restored, thereby showing that antitoxin is still being secreted although the supply of toxin has ceased. It would appear that the secretory habit of the cells of the organism remains for some time after the removal of the stimulus of the toxin.

Nature of antitoxic action.—This is a very disputed point. Some observers consider that the neutralization of the poison is brought about by a simple chemical union of the toxin with the antitoxin, and others think that it is of physiological nature, brought about by the cells of the organism.

Ehrlich is of opinion that the two bodies—the toxin and the antitoxin—unite in vitro to form a compound which is inert towards the living tissues; there being in the toxin molecule an atom group which has a specific affinity for the antitoxin molecule or a part of it, and in support of this view advanced the following facts: If toxin and antitoxin are brought together, their behaviour towards one another is similar to a chemical union. The fact that chemical neutralization has taken place is indicated by injecting the resultant body into a susceptible animal when no poisonous effects are produced. Owing to the fact that toxins will pass through a colloid membrane and the corresponding antibodies will not, it can be demonstrated that union does not take place instantaneously, but that a definite period elapses, such as occurs in all chemical unions. This can be shown by mixing equal parts of toxin and antitoxin freshly prepared and placed

within the colloid membrane. It will then be found that some of the toxin escapes before the union has been effected, and, moreover, the longer the mixture of the two substances has been allowed to stand before filtering is allowed to take place, the less toxin escapes until a point can be reached when no toxin is found in the filtrate. If a portion of fluid which has not passed through the membrane at this stage be injected into a suitable animal, no symptoms of toxæmia will appear, and so we must assume that neutralization has been complete.

The theory of chemical union is also supported by the fact that the neutralization is hastened by warmth and retarded by cold, and that it takes place more rapidly in strong solutions rather than in weak ones. It is also possible to titrate a toxin against an antitoxin with as great accuracy as pertains to acid against alkali.

Opsonins.—In 1884 Gröhmann demonstrated that blood, freed from its cellular elements, had the capacity of destroying bacteria. Later, Buchner showed that frozen blood—and in which consequently the cells had been rendered physiologically inactive—was capable of killing bacteria almost as quickly as fresh blood serum. Latterly, Wright and Douglas have carried out a series of simple experiments with serum and leucocytes separately and together, and have demonstrated that the blood plasma contains substances which produce a certain effect upon bacteria by which they are rendered more prone to be ingested by the phagocytic leucocytes. These substances they have termed opsonins from the Latin *Opsono*—I cook, I prepare pabulum for.

The opsonins are bacteriotropic substances contained in the serum, but have no bacteriocidal or bacteriolytic properties. When brought into contact with bacteria they attach themselves to them, and by their digestive action so affect them that they fall a ready prey to the phagocytes. Most observers claim that they are destroyed in a few minutes when heated to 60° C. It has been demonstrated that they are specific by the following experiments: (1) The tuberculo-opsonin can be removed from a sample of serum by treating it with an emulsion of tubercle bacilli and subsequently separating the bacilli by centrifugalization. It will then be found that the

serum will give no opsonic reaction with tubercle bacilli, but will with staphylococci; (2) The inoculation of tuberculin will cause a definite and typical disturbance in the opsonic curve for tubercle, whilst the opsonic curve for staphylococcus remains unaltered.

Wright has shown that the serum contains specific opsonins for the following bacteria: *streptococci, pneumococci, gonococci, staphylococci, B. tuberculosis, B. pestis, B. typhosus, B. coli communis, B. anthracis, B. pyocyaneus,* and *V. cholerœ.* He was unable to get any opsonic reaction with *B. diphtheriœ* and *B. xerosis.*

Daboia venom destroys the opsonins, and probably this explains the reduced resistance to septic invasion which supervenes upon viper bites.

Another bacteriotropic substance has been recently discovered in the serum of patients suffering from typhoid fever; it has the property of modifying the typhoid bacilli in such a way as to render them more liable to be destroyed in the body. This has been termed the "sensibilizing substance"; its action is very similar to that of the opsonins.

Wright has elaborated an ingenious technique for the estimation of the amount of opsonin in the blood. A small quantity of blood is run into a capsule with a recurved limb which contains an equal quantity of 1½ per cent solution of citrate of soda in physiological salt solution; having sealed the ends, the contents are shaken up and centrifugalized. When the corpuscles have settled to the bottom the supernatant citrated plasma is pipetted off and replaced by physiological salt solution. This washing and centrifugalizing is repeated three times. The upper layer of the corpuscular deposit contains a large proportion of leucocytes, and supply the phagocytes required for the process. An emulsion is next made by trituration, in 0·1 per cent salt solution, of the bacteria. Aspirate into the stem of a simple capillary pipette, furnished with a rubber teat and pencil mark on the stem, three volumes of washed corpuscles, one volume of bacterial emulsion and two volumes of serum; each volume being separated from one another by a short column of air to serve as an index. Mix thoroughly the six volumes by blowing out on to a glass slide and re-aspirating several times in succession.

When the mixture is complete withdraw it into the pipette and seal the end in the flame. Incubate at 37° C. for fifteen minutes. Break off the end of the pipette and carefully mix the contents. Make a thin film on a clean glass slide; dry and stain with Leishman's dye. The number of bacteria ingested by fifty consecutive polymorphonuclears are then counted, and an average per leucocyte is then struck.

The opsonic index is the result obtained by dividing the number of bacteria ingested per leucocyte in the presence of any given serum by the number taken up per leucocyte in the presence of the serum of a normal individual, which latter is regarded as unity. Thus: If there are four tubercle bacilli per leucocyte in the presence of a given serum, and five tubercle bacilli per leucocyte in the presence of a normal serum; then 5 : 4 :: 1 = opsonic index 0·8.

Vaccines.—Originally this term was confined to the contagious matter of cowpox used for inoculation; but of late years the meaning of it has considerably altered. Pasteur defined it as being "material obtained from cultures, and capable of producing immunity." Wright has widened the conception to "any derivatives of the protoplasm of bacteria which are capable of inducing an elaboration of protective substances." His vaccines are prepared by heating watery emulsions of recently cultivated bacteria to a temperature of 60° C. for one hour on three successive days. This heating process sterilizes the bacteria and renders the toxins inactive.

Wright's vaccines, therefore, consist of an emulsion of the protoplasm and metabolic products of bacteria; the specific toxins having been partially or completely eliminated, or at least rendered inactive, by the process of heating. The treatment of infective disease with material obtained from the infective person seems to have originated with Robert Fludd, who, in the year 1638, prepared a remedy against consumption from the sputum of consumptives. Later, Lux, who was a veterinary surgeon practising in Germany, and contemporary with Hahnemann, was the author of a brochure entitled, *The Isopathy of Contagions.* He advocated the treatment of animals with hydrophobin against hydrophobia, variolin

against small-pox, and pneumothisin against consumption.

When a vaccine is introduced into the body artificially, remarkable changes take place in the quantity of opsonins. Wright has shown that a definite course is pursued, and has described it as " the law of the ebb, flow, and reflow, and subsequent maintained high tide of immunity." He has demonstrated that inoculations of infected patients are immediately followed by " a negative phase " in which the opsonic index is lowered, and if the dose is sufficiently large it is attended by pyrexia and constitutional disturbance. This phase is sooner or later followed by a " positive phase," in which the opsonic index rises and which indicates an increased antibacterial power of the blood; and is generally attended by a sense of well-being and increased physical vigour. After the occurrence of the negative and positive phases, the blood may be maintained for a variable period at a somewhat higher level of antibacterial power than before inoculation—" maintained high tide of immunity."

The failure of Koch's tuberculin treatment is attributable chiefly to the fact that he directed that the dose should be sufficient to cause constitutional disturbance; in these doses the opsonic index always assumes an accentuated negative phase and is followed by little or no positive phase. Wright's success is clearly due to his insistence on the administration of the minimum dose which will raise the opsonic index and at the same time cause no constitutional disturbance, bearing in mind that the immunizing response is extremely limited and can be effectively provoked by very small stimuli, whereas larger ones will overtax it. The interspacing of the doses must be carefully regulated by frequent determinations of the opsonic index, for if the successive doses are inoculated during the negative phase the result will be an accumulative negative one. In practice it is found that it is necessary to repeat the dose every ten to fourteen days until convalescence ensues, after which time it may be advisable to inoculate once a month until cure has been effected. The index should be maintained at a point between 1 and 1·2; if this is exceeded there is great danger of the occurrence of a negative phase, and necrosis may occur at the seat of infection.

After making some thousands of quantitative estimations

of the opsonic power of the blood, Wright had ample evidence to show that the opsonic index is always subnormal and scarcely varies from day to day when the infective disease is strictly localized; on the other hand, when the disease is a general or systemic one, the opsonic index is continually fluctuating, sometimes being subnormal and at others far above the normal, and may reach any point between ·2 and 2·6.

The explanation which he gives of this state of affairs is that in the localized affection the bacteria are completely shut off from the general circulation, and, therefore, the blood is not being supplied by the immunizing stimuli, and in the case of the systemic disease the fluctuations of the opsonins are an expression of the periodic activation and inhibition of the machinery of immunization brought about by the conveyance of the bacterial elements in irregular doses. And in confirmation he points out that an acute infection terminates soon in death or cure, whereas a strictly localized infection does not tend to get well. This explanation of the fluctuations of the opsonins in acute cases evidently does not reveal all the facts, for on his own showing the auto-intoxication, which is taking place too frequently, ought further to accentuate the negative phase, whereas at times it rises above normal.

The question naturally arises, If there are these antibacterial bodies in the blood, how is it possible for the organisms to cultivate themselves in the body? The answer is that they can only do so in regions where the bacteriotropic pressure is lowered, i.e., in the tissues where the blood which contains the opsonins cannot get at them directly, and at most they are only exposed to the influence of the lymph, which Wright has shown contains considerably less bacteriotropic properties. He, therefore, in the treatment of localized bacterial infections, would not only attempt to raise the opsonic index of the blood, and consequently also of the lymph in a lesser degree, but would take steps to increase the flow of lymph through the affected areas by means of rubefacients, counter-irritants, poultices, fomentations, X-rays, radium, radiant heat, Finsen light, and other adjuncts.

That an immediate improvement takes place by flushing an infected area with lymph is demonstrated every day

where a fully matured abscess is opened and drained. Watson Cheyne years ago explained this improvement to be due to the fact that once the pressure is removed by evacuating the abscess, large quantities of serum oozed through the granulation tissues in which the bacteria were situated, and that the serum contained antibacterial substances which killed, or at any rate weakened, them to such an extent that they could not resist the destructive action of the tissues or phagocytes. A similar explanation attaches to the opening of the abdomen in cases of tubercular peritonitis.

Now let us turn our attention to the practical application of this method of treatment in various forms of infective disease. In the treatment of tubercular disease, Wright uses Koch's new tuberculin — known as T.R. Its preparation is a lengthy one, but it consists of a solution in glycerin of the protoplasm and metabolic products of the bacilli; the specific toxin, or at least that portion of it which causes necrosis of tubercular areas, having been extracted. Wright is in the habit of heating this T.R. for an hour at a temperature of 60° C., and the necessary dilutions are made by the addition of sterilized salt solution, to which had been previously added 0·25 per cent lysol. The dose he originally used was from $\frac{1}{6\,0\,0}$ to $\frac{1}{2\,4\,0\,0}$ part of a milligramme; but he is now inoculating with still smaller doses. The most convenient method of administering this vaccine is to have each separate dose in a hermetically sealed glass phial. It is injected subcutaneously, and if ordinary aseptic precautions are taken, the inoculation causes no inflammatory trouble; it is a wise precaution for the patient to avoid any muscular exertion for a few hours afterwards. Up to the present time this vaccine has not been administered by the mouth; but a certain degree of immunity has been obtained in the lower animals by feeding them with dead cultures of bacteria or their toxins; but this method is so tedious and uncertain, owing apparently to the activity of the digestive secretions, that it has been abandoned. It is probable, owing to the lesser activity of the secretions of the lower bowel, that rectal injections will not meet with the same disappointment; at any rate, the method is well worthy of trial in patients who dread the hypodermic needle.

It has been found that the tuberculo-opsonic index of town people free from tubercular disease always stands at a point between 0·8 and 1·2. Similar people living in the country have an index varying from 0·9 to 1·2. Tubercular subjects generally have an index which ranges outside these limits. In cases of difficulty in the diagnosis of tubercular infections the investigation of the opsonic index may be of material assistance. A high index is very suggestive of tubercular disease. Injections of tuberculin vaccine in small doses is invariably followed by a negative phase in tubercular subjects; but this is not so in non-tubercular ones, but, on the other hand, is followed by an immediate rise.

The most suitable cases of tubercular infection for the vaccine treatment are those of ulceration of the subcutaneous tissues and caries of bone; the treatment meets with uniform success.

The efficiency of this therapeusis is also very evident in cases of tubercular enlargement of the lymphatic glands which are not suppurating, caseating, nor calcifying. If a fistula has formed, it will be necessary to supplement the treatment with a vaccine of the staphylococci.

The treatment has been applied to lupus with much visible improvement, but cures are very infrequent.

The adoption of this treatment in cases of genito-urinary disease has met with very variable results. In no case should it be employed until a careful cystoscopic examination has been made to determine whether both ureters are affected; for the tubercular vaccine has caused so much swelling in the affected areas as to result in fatal suppression of urine. It is also well in these cases to make a bacteriological examination of the urine, and if any *B. coli communis* should be discovered, then precede the treatment by a few injections of the vaccine of the *B. coli communis.*

The clinical evidence of improvement or aggravation in these cases of urinary disease is usually so obvious that by some it has been considered unnecessary to control the treatment by means of opsonic estimations. Excessive doses cause loss of weight, increased pain, frequency of micturition, hæmaturia, and pyrexia.

Favourable results have been obtained in the treatment

of pulmonary tuberculosis. Where this is attended by pyrexia, or indeed when any turbecular affection is associated with pyrexia, the patient is already receiving auto-inoculations of the tubercle virus which are inappropriately adjusted. Our efforts must first be directed to bring back the infection to a condition of localized infection; and with this end in view the patient must be confined to bed to ensure the absence of any physical exertion, and the mind must be freed, as far as possible, from any mental effort and excitement.

Experience shows that where sanatorium treatment is combined with this therapeutic method, the so-called cures are effected more rapidly, and are of greater duration.

The vaccine treatment of other infective disease is most successful in cases of infection with pyogenic bacteria such as occurs in sycosis, boils, and acne. A good deal of benefit can be derived also where these cocci complicate syphilis and cancer, causing ulceration. This treatment is more successful if the vaccine is prepared from cultivations taken from the infected part rather than from a similar organism taken from some other source. The cultivation should not be more than twenty-four hours old; an emulsion is made in physiological salt solution, and this is sterilized for an hour at 60° C. Wright has been in the habit of administering the vaccines in the following doses:—

Staphylococci - -	500 to 1000	millions.
Streptococci - -	100 to 250	,,
Gonococci - -	50 to 250	,,
B. c. communis -	100 to 1000	,,

Doses of one-sixth of these amounts have been found quite effectual. It is usual to repeat them about once a fortnight.

The vaccine treatment has also been invoked as a prophylactic prior to extensive operations on the mouth and tongue in cases of cancer. It is believed that septic pneumonia has thus been avoided by an inoculation five to seven days before operation. For the same reason it has been suggested that previous to a serious abdominal operation an injection of the *B. coli communis* should be administered.

At present the published reports of the vaccine treatment

of gonorrhœal gleet, prostatitis, endometritis, salpingitis, arthritis, etc., are very scanty.

It is not possible to obtain a vaccine of the virus of syphilis—the spirochæta pallida—for the reason that it cannot be cultivated. I may mention here that bacteriologists have recently discovered that the spirillum can be greatly attenuated by passing it through anthropoid apes and the lower monkeys, and they are not without hope that a vaccine prepared from this attenuated microbe may confer immunity just in the same way that the vaccine of cow-pox confers immunity against small-pox.

Whilst endeavouring to raise the opsonic content of the blood, which seems to be indicated on thorough scientific principles, there is a danger that we should overlook those other measures which practical experience has shown to be of the very greatest benefit to the patient. We need to avail ourselves of every known hygienic measure which will raise the physiological activity of the tissues. There are many reasons for believing that immunity can be acquired by other means than by increasing the amount of opsonins in the blood. Foremost of these is perhaps the fact that whilst the sanatorium treatment of tuberculosis has effected such marvellous results, yet it altogether fails to raise the opsonic value of the blood. Professor Wright acknowledges the occurrence of spontaneous phagocytosis i.e., phagocytosis which became apparent without any addition of opsonins. The possibility of immunizing only one side of the body of an animal is very strong evidence that immunity depends upon the influence of the fixed body cells. Immunity has also been conferred by inoculation with non-specific substances such as cantharidinates, cinnamic acid, nucleinic acid, and heated horses' serum; these substances seem to act by enhancing the phagocytic reaction.

The question whether the vaccine treatment of tuberculosis is homœopathic is one of much interest to us as homœopaths. On studying this question, I have come to the conclusion that it is essentially homœopathic in all its bearings. When I approached this subject at first, I was inclined to scout the idea; on looking into it more closely, my doubts were completely dispelled, and I am full of

wonder when I contemplate how marvellously the present-day treatment of consumption conforms to the precepts laid down by our great founder.

His treatise on chronic diseases demonstrates that he recognized that many chronic diseases were due to an infection which he termed a chronic miasm or psora, and that he attributed their various manifestations to climate, abode, and mode of life of the patient. He was in the habit of treating some patients with psorin, which was material obtained from other patients who were suffering from a similar complaint.

In alluding to this subject in his *Organon* he says: "I did not include psorin in my list of antipsoric medicines, because it and other so-called isopathic remedies had not been sufficiently proved to make a sure homœopathic use of them. I say homœopathic, for the prepared psorin does not remain idem, even if given to the patient from whom it was taken, because, if it is to do him good, it can only do so in a potentized state, seeing that crude psorin, which he has in him already, being an idem, has no action on him. The preparation that develops its power (potentization) changes and modifies it, just as gold-leaf, after being potentized, is no longer crude (leaf) gold without action on the human body, but at every stage of its potentization is more and more modified and altered.

"Potentized and modified in this way, the psorin for administration is no longer idem with the crude original psorin, but only a simillimum. For between idem and simillimum there is, for those who can reflect, nothing intermediate; or, in other words, between idem and simile only simillimum can exist. Isopathic and æquale are misleading terms, which, if they can mean anything trustworthy, can only mean simillimum, because they are not idem."

According, then, to Hahnemann's showing, we can fairly assume that the tubercle vaccine is a simillimum to tuberculosis. My next enquiry was: Is the vaccine potentized according to Hahnemann's directions? Koch's new tuberculin is prepared as follows: Highly virulent tubercle bacilli are dried in vacuo and then ground up in an agate mortar and pestle, or comminuted by machinery. The dust thus obtained is treated with distilled water, and

the mixture placed in a centrifuge rotating 4000 times per minute. In this way an opalescent fluid (tuberculin oberstand) and a deposit are obtained. The solid centrifugalate is dried and mixed with distilled water and again centrifugalized; this process having been repeated several times, the fluids obtained from each repetition are mixed together, and 20 per cent of glycerin is added to the bulk. This mixture is then known as T.R. (tuberculin ruckstand), and constitutes the new tuberculin.

Here we see carried out in principle, Hahnemann's method of dynamization by trituration in a porcelain mortar, and subsequent shaking in a bottle with alcohol or water as the case may be; but the introduction of modern machinery has necessitated a modern phraseology of technique. The first part of the process is now termed comminution, and the latter centrifugalization.

Is the vaccine administered at prolonged intervals according to the directions laid down by Hahnemann in his treatise on chronic diseases? He says: "The fundamental rule of treating chronic diseases is this: to let the carefully selected homœopathic antipsoric act as long as it is capable of exercising a curative influence and there is visible improvement going on in the system." In prescribing thuja, for example, he directs a single dose to be given once in fifteen, twenty, thirty, or forty days. How does this correspond with the modern administration of vaccine once a fortnight, followed later on by a dose once a month, or even at two-month intervals?

Lastly, we may enquire, Does the dose of vaccine approximate to the infinitesimal? Tuberculin is now being administered in doses of 10,000 part of a milligramme, which would correspond approximately to two minims of a third centesimal degree of potency.

Gentlemen, I trust I have carried conviction and removed any difficulties, if there were any, among you who had any doubts as to the homœopathicity of the vaccines, and henceforth let us award to Hahnemann his due meed of praise in connection with this modern treatment of infective disease.

[A number of interesting examples of bacteria were shown under the microscope, and Dr. Watkins also illustrated his paper with instruments which were passed round to members of the Congress during the reading of the paper.]

Discussion.

The President: The vast amount of information that Dr. Watkins has collected together in a very short space shows what an amount of time and trouble he has taken in elaborating this paper, and I am sure none have listened to it who have not gained some information. It is a most interesting and complete description of the subject as it is at present known to bacteriologists. It is possible that there is less material for discussion in this paper than there was in the paper we had this morning, but at the same time there are many interesting and important points, and I hope these will be taken up. I now invite you to commence the discussion. (Applause.)

Dr. Goldsbrough considered there were two points worthy of remark as an introduction to a discussion of the subject of Dr. Watkins' paper. The first would be to emphasize the moral of the paper—that this modern research and its results are really a development of the application of the homœopathic rule. That, for us, is an extremely important point, and one that should receive the fullest emphasis that could be laid upon it. It is laid upon the successors of Hahnemann to show the medical world that in these researches they are not following an entirely original path, but a path that was laid down by Hahnemann; and it more became the Homœopathic Congress directly to show to the medical world the relationship of the work done in the direction of Hahnemann's work. This was brought forward in Dr. Watkins' paper in a clear and lucid manner. Dr. Goldsbrough thought homœopaths should be instant in season and out of season in pointing out that the only way really to get advance in medicine is along Hahnemann's lines. The second point bore upon the question whether in the vaccine treatment we have to deal with an illustration of isopathy or homœopathy. It appeared to the speaker there could not be such a thing as isopathy at all, unless the disease could be reproduced as a remedy—the disease itself, which was absurd. The disease cannot be reproduced as a medicine, under any circumstance, but only the disease product, which can be isolated and administered, the introduction of a substance which would produce a similar state to that which is found in the patient, and not the identical state. The paper afforded an illustration of the breadth of homœopathy. The homœopathic principle seemed to be capable of embracing all conceivable substances which could possibly be introduced into the body as medicines. They had been accustomed in the past to think more particularly of inorganic substances

and plants as substances which could be used as medicines. In addition to those are animal substances; for example, the serpent poisons, and now these disease products, nosodes or vaccines, which form yet an additional suggestion of the range of homœopathic principle over the whole field of medicine.

Dr. Dyce Brown: I consider that this is the most important paper that we have had for a long time. It was only quite recently that there was a great difference of opinion among our own body as to whether this treatment was homœopathic or not. Those who claimed it for homœopathy were rather out-voted, and it was declared not to be homœopathic, the majority of opinion being against it. Things, however, have been gradually coming to a climax, and Dr. Watkins has put before us to-day, in his carefully elaborated paper, facts that bring out clearly the inference that this treatment is really homœopathic. This is a very great point to have come to. We have gradually been getting to that in spite of difficulties, and of the differences of opinion in many of our own school. We now see it is essentially homœopathic, and, as Dr. Goldsbrough said, we ought to bring it prominently forward and stick to it. The old school, of course, ignored homœopathy in the matter. There is one point I should like to notice, and that is, the dose. The dose that Koch gave at first was far too large, and did an immense amount of harm. Where we find that any medicine has a deleterious effect in large doses, and a minute dose has to be given to be successfully curative, it must be homœopathic, and its double action can be explained in no other way. Wherever one finds a medicine successful in a minute dose only, that medicine must be homœopathic. This becomes of itself a very important argument in any question as to whether the treatment is homœopathic or not. The efficacy of the minute dose is still more clearly shown in Dr. Watkins' paper, when we find that this minute dose is recommended by the old school to be given at long intervals—a week, a fortnight, or a month. All this is in consonance with homœopathy and with no other system of medicine whatever. I think our case, as stated in Dr. Watkins' paper, is an important one, and I beg to thank him for it.

Dr. Madden: It seems to me what we chiefly want to settle our minds on the question of this paper is a series of provings of this tuberculin. We all know that tubercular bacilli, when brought alive and active into contact with anyone susceptible to it, will produce tuberculosis. We do not yet know how much of tubercle or the conditions allied to tubercle, the introduction of the tuberculin when it contains

the dead bacilli, and toxins only, will produce. We want that to settle the matter. If it will produce the condition indescribable from, or allied to, tubercle, we know it is distinctly a homœopathic remedy. If not, it remains isopathic and not necessarily homœopathic. The principle has been stated that a medicine acting in small doses is necessarily homœopathic, and I do not think it is a principle you can lay down with absolute certainty, but it is a suggestion, and we, at all events, are prepared to accept it as the most likely conclusion. That has not been conclusively proved. It does not seem to me to matter much whether it is isopathy or homœopathy. They are so nearly alike, they are simply branches of the same principle. Dr. Dyce Brown has inadvertently, I am sure, done some injustice in saying that the allopaths scout the idea of it being homœopathic. That is not quite true. Speaking the other day to an allopath on the question of this treatment, he used these words: "I confess I feel myself at heart a homœopath," and he could explain it on no other principle than the one we are accustomed to realize as the right principle of homœopathy. It only requires a little further pushing to the conclusion for it to be recognized that this is an example of the truth of homœopathy. Many men, as Dr. Dyce Brown has pointed out this month in the *Review*, already acknowledge homœopathy as a principle, true in many cases, though they do not acknowledge it as true in all; and this is one instance in which they are prepared to accept its truth. I thank Dr. Watkins for the very splendid paper he has read before us, and which will help to impress it upon our minds still further than any we have had before.

Dr. Johnstone: The point under discussion carries me, and I have no doubt others also, back some nine years, to the occasion of our meeting at Bristol, when, with some hesitation, I introduced a subject to this Congress, a subject then somewhat new, namely, the treatment of diphtheria by antitoxin serum, and its relation to homœopathic principles. On that occasion there was considerable diversity of opinion as to the homœopathicity of the method, the exact nature of the means, and the value of the results. To-day all is changed. Since that time, of course, the old school—we may call them that—has progressed along certain lines, and made certain discoveries which you have had in a nutshell from Dr. Watkins this afternoon, all tending to prove what I suggested at the Bristol Congress in 1897, and again at the Oxford Congress, 1903, that the treatment of diphtheria by the anti-diphtheritic serum was on homœopathic lines. I am also

particularly pleased to find one of our colleagues, who then was a little sceptical, boldly give his opinion in favour of that belief to-day. I have listened with extreme interest to the paper, and also, let me add, to Dr. Stonham's paper in the morning, and I am indeed sorry I had not the privilege of hearing the President's address. All three contributions range round the leading idea of immunity to disease. It is indeed gratifying to myself to find the Congress thus devoting its whole attention to a single subject which it was my privilege to bring to its notice nine years ago, and it must be still more gratifying to us all to find additional proofs from the latest scientific work in the dominant school that the homœopathic principle pervades modern medicine, though acknowledgment of the fact is tardy. The one doubtful point which remains to us to decide is the claim between the terms isopathy and homœopathy. I would suggest that the treatment of tuberculosis by tuberculin toxin is isopathy. On the contrary, the treatment of small-pox by cow-pox is homœopathy. In the case of the former, one uses the actual causative poison itself as a remedial agent. One may change it a little in the various processes of preparation and make believe that by such little change it has been converted into a homœopathic remedy, but that it still remains an "*idem*" is not to be denied. It is isopathy. In cow-pox there obtains a different disease. Cow-pox never produces small-pox, and yet the poison of cow-pox is a remedy for small-pox. It is the simillimum, and is an example of homœopathy. If we could only discover some case where, by producing an immunity of, say, a drug or salt, we could use that immunity against a disease, similar to the drug in pathogenetic symptoms, it would be some assistance to us as a link between isopathy and homœopathy. There was a case somewhat of this kind mentioned this morning in Dr. Stonham's paper. He referred to the use of chloride of calcium in relation to poisoning by serpent venom. I look upon that as a profitable source of confirmation of our principle. If chloride of calcium could be proved to produce an antitoxin, or some such body which will cure snake poisoning, we should have a connecting link between the principle of isopathy and the principle of homœopathy.

Dr. Kinyon: The discussion this afternoon has brought to mind an important bit of history of homœopathy in our country. The first chair of homœopathy that was ever endowed in any State University was in 1872. Then the great Dr. Hempel was authorized to go to the University of Michigan, and give a course of lectures in homœopathy

to the medical students—400 or 500 of them. The old-school profession was all up in arms. The Dean said to the students one day, " We have a humbug coming, who is to talk to you about what they call homœopathy, which also is a humbug, and I wish you to arrange that he will be made so sick that he will not repeat his visit." That was all the boys wanted—a suggestion of that sort—and they would soon arrange that the old gentleman would be sick. They met him at the depôt and surrounded the carriage, and threw some ancient eggs — and other things equally unpleasant, at the carriage. The Acting President of the Union, who was in the carriage, added to the agitation of the doctor by suggesting that possibly they had better turn round and take the next train back, and Dr. Hempel said : " It is so ; if they treat me thus, I can do no good." They turned back and he went off home, 100 miles away. Immediately following that came the Christmas holidays, during which time a great many students did not return home, but stayed at the University during the vacation. The Dean of the department, Dr. Palmer, announced that he would give a series of lectures on so-called homœopathy. He gave three lectures, which I have bound as a memento of exciting times. These lectures were answered by Dr. Dowling, of sacred memory, in a popular magazine—the *North American Review*, I think—but that did not satisfy the members of the homœopathic profession. That was in 1872, and the doctor gave those lectures every winter until our department was founded in 1875. We then had at the head of the institution a man who could hold his own in argument with any one, Samuel Jones, M.D., one of the greatest lecturers I have ever listened to. In his inimitable way, at the request of the old-school students of the University, he replied to the lectures. Boys like fair play, and they wrote Jones a note and said : " If you will give the lec ures we will come and listen." He gave three lectures—he intended to give four—on the grounds of the homœopathic faith, which have since been published in book form, and a richer, more meaty little book I never read. I think it is still procurable. I bought scores and gave them away to patients after I began practice. The point I wanted to make is this : About that time one of the greatest lecturers in the old school—Dr. Dunster—a perfect scholar and a perfect gentleman, a graduate of Harvard, made this statement—and I heard him make it—it was immediately after Palmer had given one of his course of lectures. He said : " I have not the time or inclination to discuss homœopathy or so-called allopathy, but I merely want to say if there is any such thing

as science in medicine, homœopaths have it, because they prove their drugs upon healthy persons, which is the only possible way of reaching a scientific conclusion beforehand." That utterance was made in 1876, and from that time to this we have been trying to hold up the banner in the University, and the papers to-day have brought to mind the truth I then listened to. After hearing the address and papers to-day, we know the labours of the past have not been in vain. There are many liberal, large-hearted, generous-souled men in this and our own country of the old profession recognizing to-day the truth of the law of similars.

Dr. Ord: I think the council must be congratulated on the three papers to which we have had the privilege and pleasure of listening to-day. Each paper has marked out its own lines and yet carried on the thought suggested by the previous one. It has been the most striking series of papers I have listened to at any Congress. When I think of our knowledge and ideas of homœopathy when I took up the study fourteen or fifteen years ago, and the way one's credulity was stretched in the early days—things we could not understand the possibility of became true in our professional experiences. But our faith is now realized by sight, and proved for us, not by ourselves, but by our friends the enemy. Those who threatened to destroy us, our knowledge, and our science, are now founding both on a sure and scientific basis. When one first began the study of homœopathy, one embraced the law of similars as a reliable method of practice. But on turning from allopathy we found some who advocated three great stumbling-blocks to our early faith, and appeared to prove their value by striking results. The first difficulty was the use of high potencies; the second was the use of the occasional dose; and another was the use of nosodes. All these three things to an allopath are completely staggering. He has to turn his mind right over, and look at everything from the upside-down point of view in order to grasp their significance. If in those early days I could have heard what I have heard to-day, I should have had many difficulties removed. The scientific basis on which these methods of practice depend, we have heard established to-day, and through the labours of the other school. The dominant school is now using treatment which is shown by Dr. Watkins to be practically homœopathic in its action, and I beg to thank him for a great intellectual treat, and for the great step forward given us in the truths of homœopathy to-day. (Applause.)

The President: With respect to Dr. Ord's remarks, I think